MARKET SEGMENTATION BY

AID ANALYSIS OF HOUSEHOLD CONSUMERS

OF FISH IN CUYAHOGA AND SUMMIT COUNTIES, OHIO

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FOREWORD

At Kent State University, research is being conducted under a Sea Grant project to examine the marketing and physical distribution of fish and fish products into the Midwest.* Four monographs have been published reporting the results of surveys made of the members of the distribution channel-- wholesalers, retailers, institutional users, and consumers.

The monograph dealing with consumers shows the attitudes of regular and irregular users of fish as a menu item in the home. To supplement this study of attitudes, market segmentation is analyzed by demographic and attitudinal variables of household consumers, utilizing the Automatic Interaction Detector (AID) program. The results of this program analysis are presented here.

Throughout the entire project, marketing of fresh fish as a menu item has been emphasized. To understand this, it has been necessary to study the marketing of frozen and canned fish as well. Also, emphasis has been on fish rather than on particular species.

All of the studies should prove useful to members of the fishing industry, students of marketing, and other members of the marketing channels, since they are based on the point of view of the household consumer and of suppliers of these products to the home.

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MARKET SEGMENTATION BY AID ANALYSIS OF HOUSEHOLD CONSUMERS OF FISH IN CUYAHOGA AND SUMMIT COUNTIES, OHIO

CHAPTER I

INTRODUCTION, AID PROGRAM, AND RESEARCH DESIGN

In a previous monograph, Fish as a Household Menu Item: Attitude of Consumers in Cuyahoga and Summit Counties, Ohio,[1] profiles regarding these attitudes were made of regular and irregular users of each type of fish product. Univariate comparisons of mean attitudinal scores and mean demographic values of the two groups of users were analyzed.

The variables were scrutinized further in the latter part of that monograph by means of stepwise discriminate analysis. Discriminate analysis not only isolates the significant variables in classifying regular versus irregular users of each type of fish, but it also indicates the relative importance of each variable in segregating regular from irregular users.

The material in this monograph supplements the analyses in the previous monograph. The attitudinal and demographic data of all respondents are run through the AID (Automatic Interaction Detector) program which sorts the buyers into market segments for each type of fish product in accordance

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[1]Institute for 21st Century Business Series No.5, Kent, Ohio: The Institute, Kent State University, 1974.

with their demographic (socioeconomic) characteristics and their attitudinal scores. In this monograph, consequently, there is first an introduction to the AID program. After that, the research design of the survey is discussed briefly. Based on the AID program and the research survey design, the market segments in terms of (a) demographic characteristics and (b) attitudinal variables are then presented sequentially for fresh finfish, frozen unprepared finfish, frozen prepared finfish, fresh shellfish, frozen unprepared shellfish, frozen prepared shellfish, and canned fish.

Introduction

The major objective of this research effort is to segment by group purchasing behavior the consumer markets associated with various types of fish products. The segmentation characteristics are based on socioeconomic and attitudinal variables. A multivariate program (AID - Automatic Interaction Detector) is utilized in identifying homogeneous subgroups in terms of a large number of variables. Through use of the AID program, discrimination between group purchase rate averages is maximized.

Bass, Tigert, and Lonsdale point out that regression analysis has never really provided high R^2 (coefficient of determination) values between socioeconomic and purchase rate variables.[2] This implies a large unexplained variation of

2 Frank M. Bass, Douglas J. Tigert, and Ronald T. Lonsdale, "Marketing Segmentation: Group Versus Individual Behavior," Journal of Marketing Research, 5 (August, 1968) pp. 264-270.

the dependent variable (i.e., purchase rate). The end result is to discourage use of regression analysis as a means of effectively defining markets through purchasing behavior using these characteristics. An approach which has mitigated this pessimism relates to the unit of analysis. These authors propose that the group, rather than the individual as used in regression analysis, is the relevant unit of analysis. Their strategy of market segmentation involves postulates about the characteristics and the behavior of groups, not individual persons. A revised methodology is required to accommodate this new analytical approach.

Bass, Tigert, and Lonsdale recommend the use of cross classification analysis as superior to regression analysis, given a group unit of analysis.[3] This same conclusion is reached by Andress and Armstrong.[4] Cross classification analysis and its extensions, however, proved inadequate and time consuming given a large sample and many variables, but the AID program, which was developed at the Institute for Social Research at the University of Michigan in 1964, provides a tool for effective identification and ranking of

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[3] Ibid., p. 266.

[4] James G. Andress and J. Scott Armstrong, "Exploratory Analysis of Marketing Data: Trees vs. Regression," Journal of Marketing Research, 7 (March, 1970), pp. 487-492.

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subsets of sample data by group characteristics given a
defined behavior pattern for the dependent variable. Assael's
research provides evidence supporting the use of AID over
both cross-classification and regression analysis in effect-
ively defining market segments, where the defined behavioral
pattern is frequency of purchase.[5]

AID Program

In this study, an exploratory approach is taken in
analyzing the various markets. Given the enormous base of
data for each market, a search for meaningful structures or
hypotheses constitutes the overall direction of this paper.
Extensive statistical testing of the resulting market seg-
ments (i.e., their defining predictor variables) would be an
extension of the analysis, but is not undertaken as part of
the research objective at this time. Instead, this paper
focuses on the problem of determining which of the variables
appear to be related to purchase rate behavior and under
what conditions. The approach utilizes the inductive phase
of model development rather than deductive model testing.
The AID program is specifically designed for this type of
research approach. (See Appendix for detailed discussion.)

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[5] H. Assael, "Segmenting Markets by Group Purchasing
Behavior: An Application of the AID Technique;" Journal of
Marketing Research, 7 (May, 1970), pp. 153-158.

Certain control criteria are established to control the splitting process. These are established for a given sample size and must be kept constant through the analysis. The selected control values are based on the prior work of Sonquist[6] and Morgan[7]. The control criteria and values are:

1) C1 - Maximum number of subgroups allowed.
   (C1 = 100)

2) C2 - Minimum number of data cases per subgroup required.
   (C2 = 50)

3) C3 - Ratio of between sum squares to total sum of squares of subgroup required. i.e., BSS_i/TSS_i or split reducibility criterion.
   C3 = 0.006)

4) C4 - Ratio of total sum of squares of subgroup to total sum of squares of original sample. i.e., split eligibility criterion.
   (C4 - 0.001)

These control criteria enable maximum splitting but terminate splitting at those points where spuriousness begins to enter the program.

A brief digression is now made to discuss the overall perspective within which AID lends insight into cause and

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[6]J. A. Sonquist, Multivariate Model Building: The Validation of a Search Strategy. Ann Arbor, Michigan: Institute for Social Research, The University of Michigan, March, 1970, pp. 153-162.

[7]J. N. Morgan and J. A. Sonquist, The Determination of Interaction Effects, Monograph No. 35, Ann Arbor, Michigan: Institute for Social Research, the University of Michigan, 1964, p. 114.

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effect relationships. The survey data can be structured as follows:

Y = dependent variable (purchase rate)

X_1, X_2 X_3, ... X_n = independent variables
(attitudes or socioeconomic characteristics)

The purpose is to explain or "predict" the dependent variable (Y) by means of a function representing the joint effects of the X_n, that is, Y = F $(X_1$, X_2, X_3, ... $X_n)$ + E where E is an error term. All of these variables are random. The objective is to find a stable function which predicts Y values based on the X_n, such that E is minimized. The AID program is one way of determining this function. Since this determination is quantitative in nature, it clearly does not provide an explanation of the causal relationships. This is accomplished by logical interpretation.

The joint effect of the X_n on Y can be viewed as being additive, interactive, or intercorrelated. Additivity occurs when the joint effect of the X_n equals the sum of the individual effects. Interaction occurs when the joint effect is less than or greater than the sum of the individual effects. Intercorrelation occurs when a direct relationship exists between independent variables which also directly effect the dependent variable. The structural characteristics of these different cause-effect relationships are discussed in depth by Morgan and Sonquist.[8] The AID program

8 J. N. Morgan and J. A. Sonquist, "Problems in the Analysis of Survey Data and a Proposal," Journal of the American Statistical Association. 58 (June, 1963), pp. 415-435.

can accurately accommodate the first two conditions
(additivity and interaction) but can be misleading when
the third condition (intercorrelation) is excessive. A
second computer program (MCA - Multiple Classification
Analysis) exists which, when jointly used with AID, permits
accommodation on all three conditions in establishing the
predictive function. This joint program strategy was
developed by Sonquist[9] and commented upon by Ness and
Parsons[10].

The end result of the AID program is a set of mutually
exclusive subgroups of the original sample. Each subgroup
is defined by a particular combination of characteristics
(categories of predictor variables). Each subgroup has
three important statistical characteristics. They are:

    1) original sample percentage

    2) dependent variable mean (i.e., % Regular users)

    3) probability index

The original sample percentage indicates how many of the
original sample respondents are included in the subgroup,
e.g., a subgroup of 50 individuals out of an original sample
of 500 is 10 per cent.

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[9] Op. cit., Sonquist, p. 189-219.

[10] Thomas E. Ness and Leonard J. Parsons, "Using AID
and MCA to Analyze Marketing Data," Combined Proceedings
of the National Meeting of the American Marketing Association,
1971 - Spring-Fall Conference, Series No. 33, Chicago: The
Association, 1972.

The dependent variable mean refers to the arithmetic mean of given respondent behavior in the subgroup. In the case of a dichotomous dependent variable where the respondent is classified as "Yes" or "No" regarding a defined behavior, the dependent variable mean can be expressed as a percentage. Whether a person is a regular fish product user or not is the behavior defined. For example, out of the 50 members of a subgroup, 30 may be regular users of a fish product, indicating 60 per cent of the subgroup are regular users.

The probability index represents the increase or decrease in the probability of a subgroup respondent being a regular user of a fish product given the associated market segment. For example, a market segment representing ten per cent of the original sample and containing 20 per cent of the total regular users of a particular type of fish in the original sample would have a probability index of 2.00 (20% ÷ 10%). i.e., the probability of a respondent in this segment being a regular user is twice that of the original sample.

It is now possible to rank by probability index the subgroups as potentially relevant or irrelevant market segments. For example, a subgroup representing ten per cent of the original sample may contain 60 per cent of the total regular users of a fish product in the original sample for a probability index of 6.00. Conversely, a subgroup containing 60 per cent of the original sample may contain only ten per

cent of the total regular users in the original sample for
a probability index of 0.16. The higher the probability
index, the greater the concentration of those respondents
who are regular users of a given fish product.

Another output of the AID program is a ranking of pre-
dictor variables used in identifying the various subgroups
and maximizing explained variation. Also important because
of their elimination is the absence of the remaining variables.
These omitted variables have little, if any, effect on the
dependent variable.

Two other forms of output from the AID program are
utilized. These include (a) the "AID-Tree" which indicates
the series of binary splits occurring in going from the
original sample to the final subgroups; and (b) a Split
Data Table that shows the specific statistics calculated
for each variable at each stage in the AID tree. The Split
Data Table provides information regarding the characteristics
of each split, i.e., the competitor variables and degree of
competition on each split. Evaluation of this table enables
the analyst to estimate possible intercorrelation. For this
reason, this table is a basic part of any analytical effort
using AID.

The two most limiting features of AID are spurious
splits and intercorrelations. The first limiting feature is
basically a function of sample size. The smaller the group
being considered for splitting, the greater the probability

of a spurious split, i.e., a split made on a predictor variable which is not the most predictive of those available. This situation can be minimized by using large original samples of 1,000 or more respondents and splitting subgroups only when they contain 50 or more respondents. In this way, the effect of sample variability and spurious splits can be reduced.

The second limiting feature concerning excessive levels of intercorrelation among predictors may lead to confusing results. Because AID is a step-wise algorithm, the aggregate effect of intercorrelated predictor variables is assigned in whole to one predictor and the other is omitted. The predictive power of the retained predictor, consequently, may be overstated and a potentially relevant variable omitted. Excessive intercorrelation must occur, however, to significantly affect the validity of the tree structure. Intercorrelation may be determined by the reader by examination of the data in the Split Data Table. Where excessive intercorrelation exists, a joint strategy using MCA and AID is recommended.

Research Design

A random sample of individuals was selected from Summit and Cuyahoga counties in Northeastern Ohio. A mail questionnaire was developed which asked individuals to record their attitudes toward certain fish products. Additional classification information was obtained, primarily dealing with socioeconomic characteristics and various behavior patterns.

This questionnaire was pretested, revised, and sent out in March, 1972. Initial returns and follow-up returns were completed in June, 1972, and numbered 1,730 respondents.

The questionnaires were edited, coded, and the resulting data punched on cards. The information was transferred subsequently to magnetic tape. A data preparation program was then written for AID which not only filtered out respondents with missing information but also recoded certain variables where required. This revised tape provided the input for the AID program.

Seven different consumer markets were defined. These are characterized by the following fish products and their definitions:

1. FRESH FINFISH - All types of fish such as haddock, cod, flounder, or perch that are bought unfrozen and unprepared.

2. FROZEN UNPREPARED FINFISH - All types of fish such as haddock, cod, flounder, or perch that are bought frozen but without breading, etc.

3. FROZEN PREPARED FINFISH - All types of fish such as haddock, cod, flounder, or perch that are bought frozen and ready to cook; for example, fish sticks or breaded fillets.

4. FRESH SHELLFISH - All types of shellfish such as shrimp, clams, oysters, or lobsters that are bought unfrozen and unprepared.

5. FROZEN UNPREPARED SHELLFISH - All types of shellfish such as shrimp, clams, oysters, or lobsters that are bought frozen but without breading, etc.

6. FROZEN PREPARED SHELLFISH - All types of shellfish such as shrimp, clams, oysters, or lobsters that are bought frozen and ready to cook; for example, breaded shrimp or breaded clams.

7. CANNED FISH - All types of fish that are bought canned such as sardines, tuna, salmon, mackerel, and so forth.

For each type of fish a series of 24 semantic differential questions were asked about the respondent's attitudes. The attitudinal ratings dealt not only with the fish product, but also asked for comparisons to meat. Table 1 lists these attitudinal variables and the corresponding extremes associated with each semantic differential scale (Page 13.).

Each scale was subdivided into seven categories of possible ordered response. These categories were associated with bridging the polar extremes and are: 1)extremely, 2) quite, 3) slightly, 4) neither one, 5) slightly, 6) quite, 7) extremely. Category one was always assigned to the favorable polar extreme; category seven associated with the unfavorable extreme. The intermediate categories were then numbered on the ordered basis of the semantic differential scale. For example, the attitudinal variable dealing with taste appeared as shown below on the questionnaire:

TASTE

	GOOD						BAD
FRESH FISH	:	:	:	:	:	:	:
FROZEN UNPREPARED FISH	:	:	:	:	:	:	:
FROZEN PREPARED FISH	:	:	:	:	:	:	:
FRESH SHELLFISH	:	:	:	:	:	:	:
FROZEN UNPREPARED SHELLFISH	:	:	:	:	:	:	:
FROZEN PREPARED SHELLFISH	:	:	:	:	:	:	:
CANNED FISH	:	:	:	:	:	:	:

TABLE 1.

ATTITUDINAL VARIABLES

Variable Name	Number of Categories	Bi-Polar Extremes
1. TASTE	7	Good taste-bad taste.
2. TASTE (C)*	7	Better than-worse than meats.
3. NUTRITION	7	Nutritious-unnutritious.
4. NUTRITION (C)	7	Better than-worse than meats.
5. COST	7	Reasonably-unreasonably priced.
6. COST (C)	7	Lower-Higher priced than meats.
7. AROMA	7	Good aroma-bad aroma.
8. AROMA (C)	7	Better than-worse than meats.
9. PERISHABILITY	7	Keeps easily-spoils quickly.
10. PERISHABILITY (C)	7	Better than-worse than meats.
11. PREPARATION (Before cooking)	7	Easy - difficult to prepare.
12. PREPARATION (C) (Before cooking)	7	Easier-worse than meats.
13. COOKING	7	Easy-difficult to cook.
14. COOKING (C)	7	Easier-worse than meats.
15. APPEARANCE	7	Appetizing-unappetizing appearance.
16. APPEARANCE (C)	7	Better-worse appearance than meats.
17. QUALITY	7	Reliable-unreliable quality.
18. QUALITY (C)	7	Better-worse than meats.
19. AVAILABILITY	7	Usually-not usually available.
20. IMAGE (1)	7	Special treat-just another meal.
21. IMAGE (2)	7	Nice meal for guest-wouldn't consider serving.
22. IMAGE (3)	7	Good-bad for weight-watchers.
23. WHOLESOME	7	Safe-unsafe to eat.
24. WHOLESOME (C)	7	Safer-worse than meats.

*(C) refers to comparison with meats.

Six socioeconomic variables were identified. Table 2 (Page 15) lists them and their corresponding categories.

The dependent variable (Y) is a structured dichotomy. A respondent is classified as either a regular or irregular user of a fish product. A respondent indicating at least one purchase or more a month is classified as a regular user of that particular form of fish. A respondent who purchased fish less than once a month is classified as an irregular user. The dichotomous dependent variable is the same for both sets of predictor variables and across the various markets being examined.

With the identification of both independent and dependent variables, the initial preparation for the AID analysis is completed. Each type of fish will require two AID computer runs to determine regular and irregular users in each market. The first set is based on the socioeconomic variables of the respondents and the second set on their attitudinal variables. Here the objective is to determine which set has the highest predictive power and corresponding highest coefficient of determination. In general the higher the coefficient of determination, the greater the discrimination between average purchase rates of the various market segments. A total of 14 AID runs are made.

TABLE 2

SOCIOECONOMIC VARIABLES

1. AGE (Respondent)

Categories:

1. under 26
2. 26 to 35
3. 36 to 45
4. 46 to 55
5. 56 to 65
6. over 65

2. INCOME

Categories:

1. under $4,000
2. $4,000 to $5,999
3. $6,000 to $7,999
4. $8,000 to $9,999
5. $10,000 to $11,999
6. $12,000 to $13,999
7. over $14,000

3. HOUSEHOLD SIZE

Categories:

1. 1 person
2. 2-3 persons
3. 4-5 persons
4. 6-7 persons
5. 8-9 persons
6. over 10 persons

4. OCCUPATION

Categories:

1. Respondent not married, either employed or unemployed.
2. Husband other*, wife unemployed.
3. Husband other, wife employed.
4. Husband blue collar, wife unemployed.
5. Husband blue collar, wife employed.
6. Husband white collar, wife unemployed.
7. Husband white collar, wife employed.

5. RELIGION

Categories:

1. Protestant
2. Catholic
3. Jewish
4. other

6. RACE

Categories:

1. white
2. black
3. other

* Included those who are students, retired, or unemployed.

Each AID run leads to three output documents. These are:

1) AID Tree

2) Market Segments

3) Predictor Rank

The Split Data Tables, although referred to, will not be included in the documentation because of excessive length.

The three output documents are given for each market based on both socioeconomic and attitudinal variable sets. They are used in evaluating the market segmentation. A summary of results is then presented for each market. The market for fresh finfish is discussed first.

CHAPTER II

ANALYSIS OF THE FRESH FINFISH CONSUMER MARKET

As described above, the market is segmented on the basis
of the two independent sets of predictor variables, i.e.,
socioeconomic and attitudinal variables. The defined behavior
pattern or dependent variable in each case is frequency of
purchase. A respondent is classified as a regular user if
he purchases fresh finfish at least once a month, or as an
irregular user if he purchases fresh finfish less frequently.
This applies to all subsequent analysis of the various fish
product markets.

The number of cases used in the fresh finfish market
analysis corresponds to 1,546 respondents. This is less than
the original sample of 1,730 respondents, but this is due
to the omission of those cases where there were missing data.
This filtering process is used in each fish product market
analysis. The average purchase rate mean for this sample is
37.9 per cent or 585 respondents who are classified as
regular users of fresh finfish.

Socioeconomic Variables

Three socioeconomic predictor variables explain 7.3
per cent of the variation of the dependent variable. An
explanation of 100 per cent corresponds to complete predicta-
bility or perfect correlation, i.e., $R^2=1.00$. These variables
are RACE, AGE and RELIGION. RACE and AGE are the most
important variables (see Table 3).

Three of the four terminal groups in the AID Tree
(Figure 1) have probability indexes greater than 1.00 and
account for 85.7 per cent of the original sample. (See
Groups 2, 4, and 7.) The AID program split on RACE as the
first socioeconomic variable and terminated its analysis of
Group 2 (the upper half of the binary split) with RACE.
Terminal Group 2 is comprised of Negroes. The Negro segment
of the fresh finfish market includes 9.2 per cent of the
respondents and represents 16.5 per cent of the total number
of regular fresh finfish users for a probability index of
1.79. Traditionally, the black community has been a hearty
consumer of fresh finfish, so this resulting market segment
is to be expected. The high average purchase rate for
Negroes may be a result of economic need (low prices for
certain species) and their strong ethnic preference for fresh
finfish.

Examination of the supportive splitting statistics
reveals that AGE almost split Group 2 (Figure 1). The
lower average purchase rate belongs to younger Negro respon-
dents. This suggests that a traditionally strong market for
fresh finfish is now weakening, since the under 35 age group
for Negroes reflects the much smaller average purchase rate.
This may reflect the rising affluence of the younger Negro
family (and resulting increased purchasing power) as well
as an alteration of traditional food consumption patterns.
Further analysis of Groups 4 and 5, however, indicates that

TABLE 3

FRESH FINFISH - SOCIOECONOMIC & ATTITUDINAL VARIABLES

Predictor Rank

Predictor		Rank
Socioeconomic		
RACE	3.8	3
AGE	2.8	6
RELIGION	0.7	4

Total Explained Variation=7.3% (i.e., R^2=0.073

Attitudinal		
TASTE	11.9	7
QUALITY	5.9	7
APPEARANCE	2.4	7
APPEARANCE (C)	2.3	7
PREPARATION (C)	1.7	7
TASTE (C)	1.1	7
AROMA	1.0	7
IMAGE (2)	0.8	7

Total Explained Variation=27.1% (i.e., R^2=0.271)

FIGURE 1

FRESH FISH - SOCIOECONOMIC VARIABLES

AID TREE
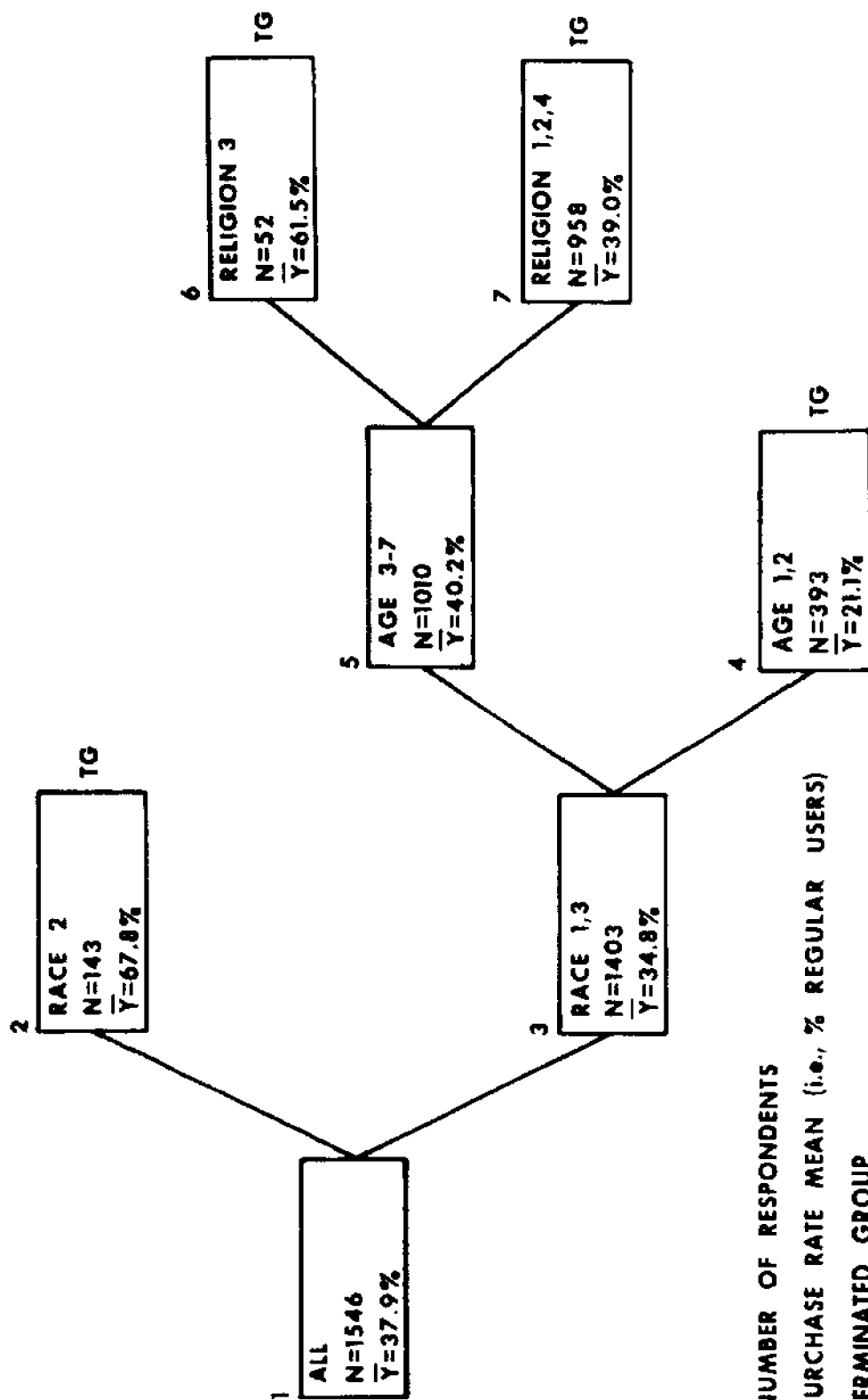
WHERE:

N = NUMBER OF RESPONDENTS

$\overline{Y}$ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

non-Negro respondents under 35 years of age also consume fresh finfish less often than older respondents. Thus the decrease in consumption of fresh finfish by younger Negroes is not unique to their race only. An important question to be asked (although not treated in this research) is whether or not this behavior reflects a changing purchase pattern or simply a traditional division of fresh finfish consumption between young and old. At the same time, nonetheless, the group of younger respondents (see Group 4, Figure 1) with a lower average purchase rate of fresh finfish is almost split by the INCOME variable. Younger families with lower income who are non-Negro tend to purchase more fresh finfish than those with higher incomes. This effect is minor, however.

The RELIGION variable has a small but significant effect on the average purchase rate. Respondents of the Jewish faith have an average purchase rate of 61.5 per cent as compared to an average of 39.0 per cent for non-Jewish respondents (see Group 6 and 7, Figure 1). However, the resulting market segment is small, representing only 3.4 per cent of the original sample.

The data in Table 4 (Group 7) show that 63.8 per cent of the regular fresh finfish users are people over 35 years of age, non-Negro and non-Jewish. They constitute 62 per cent of the sample for a probability index of 1.03. While Negroes and Jewish people are more likely to be regular

TABLE 4

FRESH FINFISH - SOCIOECONOMIC VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Y)	Socioeconomic Characteristics of Respondents	% of Original Sample Respon.	% of Total Reg. Users	Probability Index*
2	143	67.8	a) Negro	9.2	16.5	1.79
6	52	61.5	a) White or non-Negro b) Over 35 Years of Age c) Jewish	3.4	5.4	1.62
7	958	39.0	a) White or non-Negro b) Over 35 Years of Age c) Non-Jewish	62.0	63.8	1.03
4	393	21.1	a) White or non-Negro b) Under 35 Years of Age	25.4	14.3	0.55
**TOTAL	1546	37.9	N/A	100%	100%	1.00

* This index is obtained by dividing the per cent of total
regular users (Column 6) by the per cent of original sample
respondents (Column 5).

** This represents the original sample.

users, proportionally speaking, a majority of the regular
users are the non-Negro, non-Jewish segment of the population
35 years of age or older.

The Catholic religion has required in the past (although
now altered) consumption of fish on Friday. However, the
expected residual effect of substantial Friday sales is not
evident in the fresh finfish market since the religious
variable "Catholic or not" is not a significant element in
the AID analysis. This might indicate a validity problem
with the AID algorithm. However, this variable does appear
subsequently in the frozen prepared finfish market.

In summary:

1. The socioeconomic variables combine to explain
   7.3 per cent of the variation of the dependent
   variable, i.e., $R^2 = 0.073$.

2. The Negro consumes a greater proportion of
   fresh finfish than the other races.

3. The younger generation (under 35 years of age)
   shows a lower level of fresh finfish consump-
   tion. This applies equally to all races.

4. The Jewish faith--not the Catholic--provides
   a better explanation of purchase rate
   behavior. Jewish respondents have higher
   levels of fresh finfish consumption.

5. A limited amount of fresh finfish is purchased

by a small subset of consumers (primarily
younger families with lower incomes) because
of its low cost profile for certain species.

6. The majority of regular purchasers of fresh
finfish are non-Negro, non-Jewish, and at
least 35 years of age.

Attitudinal Variables

Eight of the 24 attitudinal predictor variables account
for 27.1 per cent of the variation in purchase behavior
between the regular and irregular purchasers of fresh finfish.
The most important of these variables is TASTE (see Table 3).

Five terminal groups (i.e., market segments) have
probability indexes greater than 1.00 and represent 49.6
per cent of the original sample. The most important of
these groups (see Group 12 Table 5) accounts for 17.2 per
cent of the original sample but has 34.6 per cent of the
total regular fresh finfish users for a probability index
of 2.01. In other words, the probability of a respondent
possessing these attitudes being a regular fresh finfish
user is approximately twice as great as that associated with
a respondent randomly selected from the original sample.
The four attitudes associated with this segment (Group 12)
concern themselves with tangible product attributes.
Favorable taste and quality attitudes are primary. Additional
emphasis is placed on fresh finfish preference over meat, in

TABLE 5

FRESH FINFISH - ATTITUDINAL VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Y)	Attitudinal Characteristics of Respondents FAVORABLE	UNFAVORABLE	% of Original Sample	% of Total Reg. Users	Probability Index
12	266	76.3	TASTE QUALITY APPEARANCE (C) TASTE (C)		17.2	34.6	2.01
6	81	65.4	TASTE APPEARANCE	QUALITY	5.2	9.0	1.74
16	94	55.3	TASTE QUALITY IMAGE (2)	APPEARANCE(C)	6.1	8.9	1.45
13	103	53.4	TASTE QUALITY APPEARANCE (C)	TASTE (C)	6.7	9.4	1.40
8	223	43.5	TASTE PREPARATION(C)	QUALITY APPEARANCE	14.4	16.5	1.14
14	164	34.1	TASTE AROMA	QUALITY APPEARANCE PREPARATION(C)	10.6	9.6	0.90
17	75	28.0	TASTE QUALITY	APPEARANCE(C) IMAGE (2)	4.9	3.7	0.73
15	221	14.4	TASTE	QUALITY APPEARANCE PREPARATION(C) AROMA	14.3	5.6	0.38
3	319	5.0		TASTE	20.6	2.7	0.13
TOTAL	1546		N/A		100%	100%	1.00

terms of appearance and taste of fresh finfish compared to meat. All four of these attitudinal dispostions (Table 5) imply a market segment composed of individuals who are consumers of fresh finfish because of strong product preference. To these people, fresh finfish is an exceptionally appealing product.

For all nine market segments, there is little evidence in the AID Tree (Figure 2) to support a strong economic motive in buying fresh finfish. In addition, prestige, convenience, and diet considerations also have little effect on the regular fresh finfish consumer. The market segment with the lowest probability index where the sole defining attitudinal characteristic on which this group is segmented is one of unpleasant taste. Although this group accounts for 20.6 per cent of the original sample, it includes only 2.7 per cent of the regular fresh finfish users. This results in a probability index of 0.13.

The fresh finfish market can be structured as a dichotomy in terms of the attitudinal variables, that is, those who innately like or dislike the "physical food satisfying capacity" of fresh finfish. There are few individuals between.

Several ancillary attributes of fresh finfish enhance the purchase rate, but their overall effect is minor. For example, Group 7 (Figure 2) is split on PREPARATION (C). Respondents who feel that the preparation of fresh finfish is easier than meat have a higher average purchase rate.

FIGURE 2

FRESH FISH - ATTITUDINAL VARIABLES

AID TREE
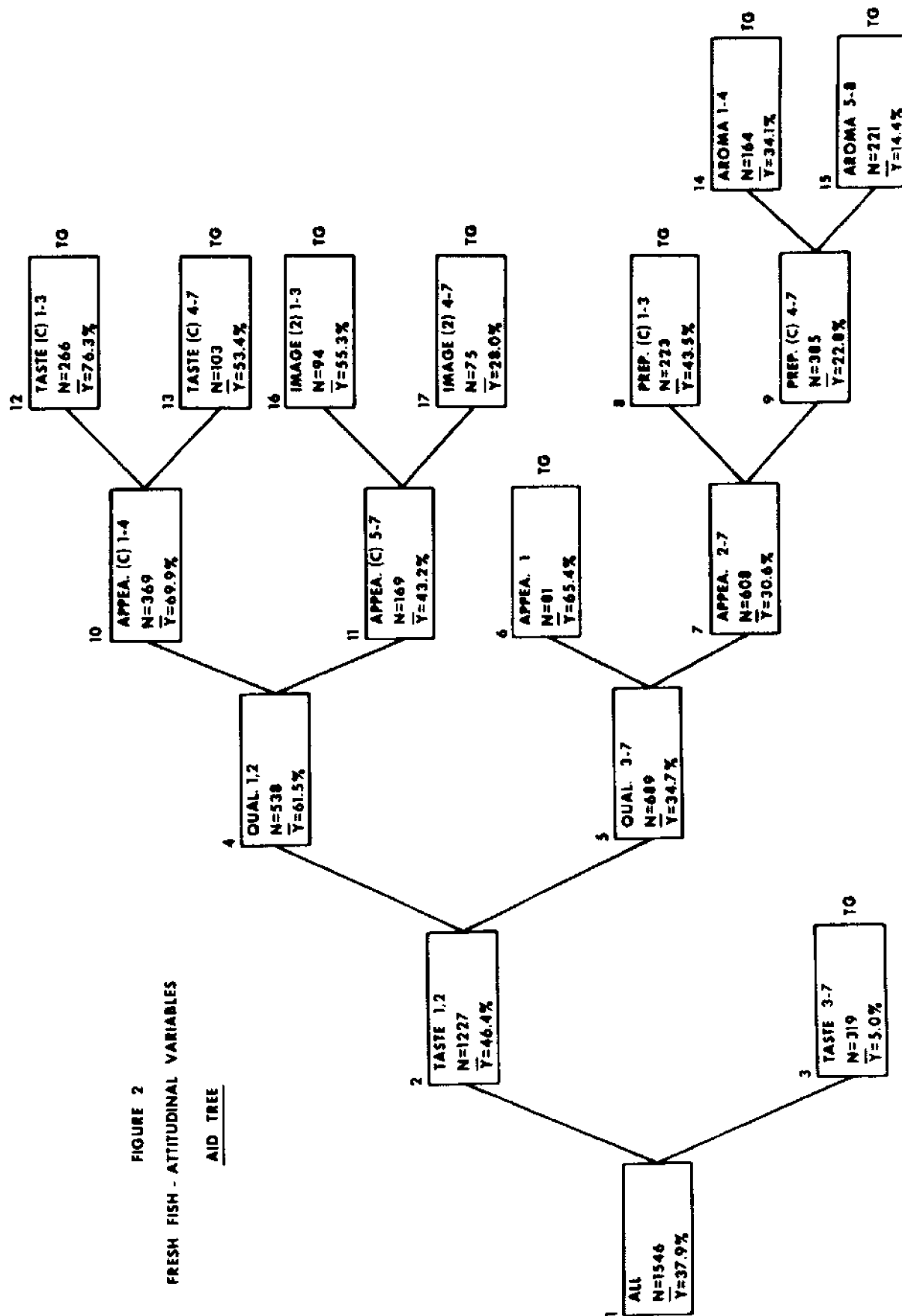
WHERE:

N = NUMBER OF RESPONDENTS

Ȳ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

Similarly, Group 8 (Figure 2) is almost split on COST (C) which indicates a favorable cost differential over meats, while Group 11 is split by IMAGE (2) which indicates a higher average purchase rate for those respondents regarding fresh finfish as an impressive product to serve guests.

A problem quite evident in the attitudinal ratings is the large number of respondents who express a favorable attitude towards taste (N=1227, Group 2 - Figure 2), but who have misgivings about the quality and appearance (N=608, Group 7 - Figure 2). This may be the result of past experiences with poor quality fresh finfish. Fresh finfish, if not properly handled and stored, can become an "offensive" food product, not only in appearance but in odor as well. Approximately 50 per cent of those who like the taste of fresh finfish (and as examined earlier, provide the major reason for fresh finfish consumption) distrust the quality and appearance of the product. For those individuals attempting to market fresh finfish, this problem must be examined. Restoration of consumer confidence that fresh finfish is truly "fresh" would significantly increase sales of this product.

The problem of extensive intercorrelation among the predictor variables appears minimal. This is usually the case for the predictor variables in the various consumer markets, except when specifically mentioned.

Interaction rather than additivity dominates the AID-Tree (Figure 2). The AID-Tree is unsymmetric which indicates the presence of interaction among the predictor variables. Conversely, a sufficient condition for additivity is one of symmetry.

The types of interaction present may be defined as cumulative advantage (disadvantage) and alternating advantage (disadvantage). Alternating disadvantages are usually associated with a series of cumulative advantages and likewise for alternating advantages and cumulative disadvantages. In market segmentation applications, concern is primarily focused on the series of cumulative disadvantages and/or cumulative advantages. The cumulative designation series refers to a set of predictor variable categories which lead to cumulative higher (cumulative advantage) or lower (cumulative disadvantage) average purchase rate levels during the splitting process. Maximum discrimination of average purchase rates is generally found by examining these two "branches" of the AID Tree.

A set of four variables with certain categories - TASTE, QUALITY, APPEARANCE (C), AND TASTE (C) - constitute a cumulative advantage series (Groups 2, 4, 10, and 12, Figure 2).

As may be seen from Figure 2, beginning with Group 2 of the cumulative advantage series,the average purchase rates increase until a final subgroup is reached (Group 12)

which incidentally has the highest average purchase rate
level (76.3 per cent) of the AID Tree. Similarly the
cumulative disadvantage series results in the lowest average
purchase rate level (14.4 per cent for Group 15) for the AID
Tree. In this way, the most diverse average purchase rate
levels of the AID Tree can be found.

Alternating disadvantages (lower average purchase rate)
to the cumulative advantage series are seen in Groups 5, 11,
and 13 (Figure 2). Alternating advantages (higher dependent
variable) to the cumulative disadvantage series are seen in
Groups 6, 8, and 14 (Figure 2).

Examination of the AID Tree from the above conceptual
framework often provides a better overall understanding of
what has happened, as compared to the micro-examination of
various supporting data which sometimes enmeshes the reader
in detail, especially when the AID Tree is large.

In summary:

1. The attitudinal variables account for more
   of the variation of the dependent variable
   than the socioeconomic variables (27.1 per
   cent versus 7.3 per cent).

2. The "physical food-satisfying" characteristics
   of fresh finfish (especially taste) provide
   for the most discriminant identification of
   market segments. Economic, prestige, conven-
   ience, and diet attributes of fresh finfish

appear to have little effect on consumer
purchase rate.

3. Consumer's concerns over the freshness of
   fresh finfish have significantly reduced
   sales from potential.

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CHAPTER III

ANALYSIS OF THE FROZEN UNPREPARED

FINFISH CONSUMER MARKET

The number of cases used in the frozen unprepared
finfish consumer market analysis corresponds to 1546
respondents. The average purchase rate (purchase rate mean)
for this sample is 32.7 per cent or 506 respondents who are
classified as regular users of frozen unprepared finfish.

Socioeconomic Variables

The only important socioeconomic predictor variable is
INCOME. It accounts for 2.0 per cent of the variation of
the dependent variable (Table 6). This is much less than
for fresh finfish where socioeconomic variables accounted
for 7.3 per cent of the variation. Individuals with an
income over $14,000 have a higher average purchase rate
than respondents with less annual income (Table 7).

The split on INCOME has a large BSS_i/TSS_i ratio which
is indicative of its relative importance (Figure 3).
Higher income respondents may purchase frozen unprepared
finfish more frequently for several reasons. First, the
prior analysis of fresh finfish showed a large number of
respondents who had developed a taste for fresh finfish but
held reservations about the quality and appearance of the
product. Perhaps they consider frozen unprepared finfish
a feasible alternative.

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Second, higher income families oftimes include both a
husband and working spouse. Convenience of both shopping
and preparation activities (prior to cooking) in the purchase
of frozen unprepared finfish may be desirable, especially
given a preferred taste for fish products.

The other socioeconomic variables exhibit little pre-
dictive ability. Religion exerts some effect. Catholics
and Jews have higher average purchase rates, but the difference
in purchase rates is not enough to cause splitting in the
AID analysis.

Extensive intercorrelation appears to exist between
the two variables, INCOME and OCCUPATION. Examination of
the supporting splitting statistics reveals that the
alternate choice for the first split made on INCOME is
OCCUPATION. However, OCCUPATION's predictive ability is
extremely low after the first split. This loss of predic-
tive power is usually the result of intercorrelation. When
intercorrelation exists, the first variable assumes the
aggregate predictive ability of both intercorrelated
predictors. The implication is that, rather than one
predictor variable with strong explanatory power, the
situation may be more accurately defined by two predictor
variables with moderate explanatory power. The use of the
MCA program could provide a more accurate description of
the effects of the two variables, when used in conjunction
with the AID program.

TABLE 6

FROZEN UNPREPARED FINFISH
SOCIOECONOMIC & ATTITUDINAL VARIABLES

Predictor Rank

Predictor	Explained Variation (%)	Number of Categories
Socioeconomic		
INCOME	2.0	7

Total Explained Variation=2.0% (i.e., R^2=0.020)

Predictor	Explained Variation (%)	Number of Categories
Attitudinal		
TASTE	18.1	7
QUALITY	2.9	7
COST (C)	1.5	7
PREPARATION	1.2	7
APPEARANCE	0.9	7
IMAGE (2)	0.8	7
AROMA (C)	0.8	7
QUALITY (C)	0.8	7
PERISHABILITY (C)	0.7	7

Total Explained Variation=27.7% (i.e., R^2=0.277)

FIGURE 3

FROZEN UNPREPARED FISH - SOCIOECONOMIC VARIABLES

AID TREE


```
                    1
                  ┌──────────┐
                  │ ALL      │
                  │ N=1546   │
                  │ Y=32.7%  │
                  └──────────┘
           ╱                      ╲
    3                              2
  ┌──────────┐ TG            ┌──────────┐ TG
  │ INCOME 7 │               │ INCOME 1-6│
  │ N=457    │               │ N=1089   │
  │ Y=43.1%  │               │ Y=28.3%  │
  └──────────┘               └──────────┘
```
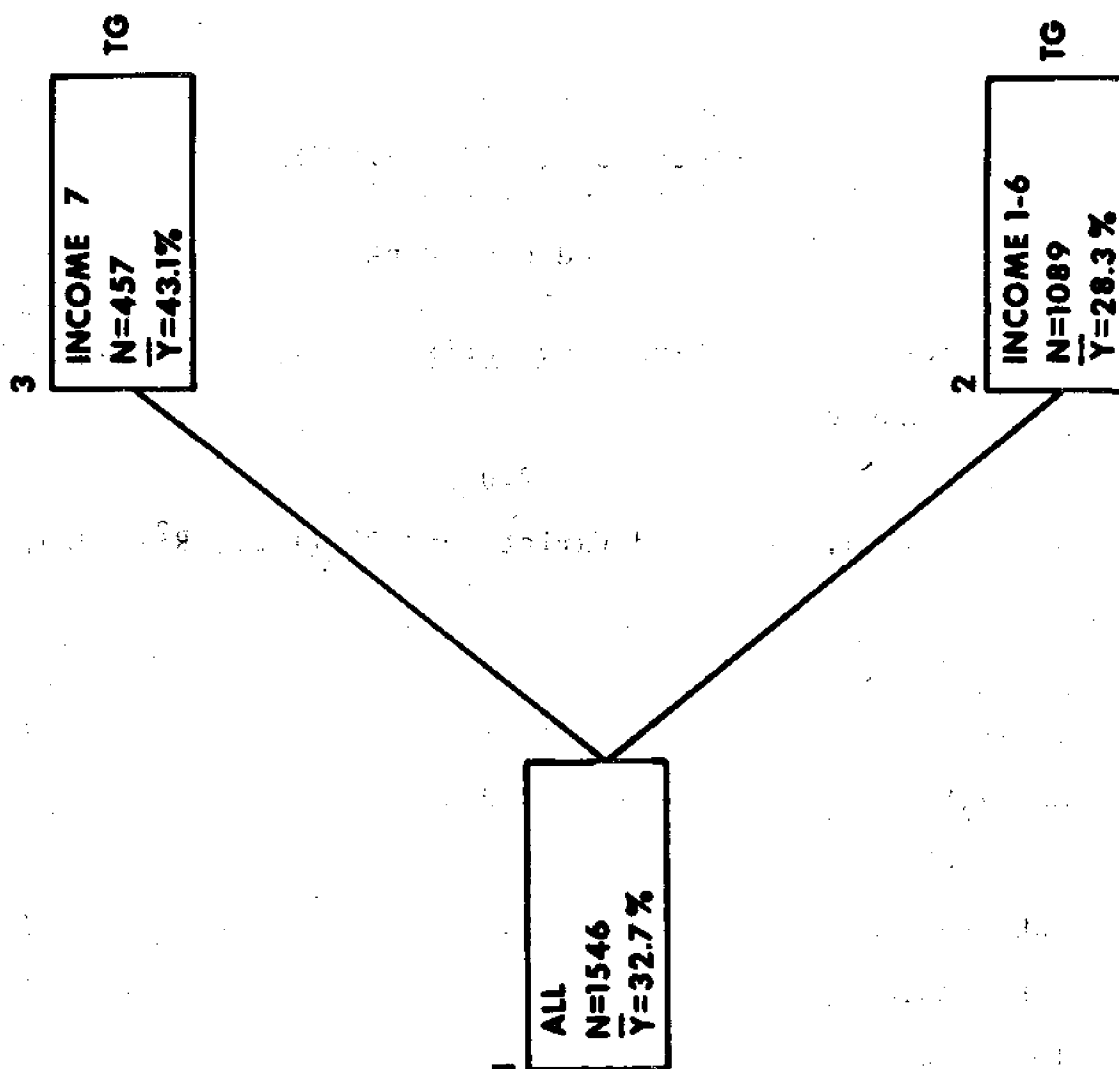
WHERE:

N = NUMBER OF RESPONDENT

Ȳ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

TABLE 7

FROZEN UNPREPARED FINFISH - SOCIOECONOMIC VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Y)	Socioeconomic Characteristics of Respondents	% of Original Sample	% of Total Reg. Users	Probability Index
3	457	43.1	a) High Income	29.6	39.1	1.32
2	1,089	28.3	b) Middle to Low Income	70.4	60.9	0.87
TOTAL	1,546	32.7	N/A	100%	100%	1.00

In summary:

1. The socioeconomic variables explain 2.0 per cent of the variation of the dependent variable.

2. High income respondents (over $14,000) maintain higher levels of frozen unprepared finfish consumption than the other respondents.

Attitudinal Variables

Of the 12 terminal groups in Table 8, the seven groups with probability indices of 1.00 or more encompass 77.1 per cent of the regular frozen unprepared finfish users. In this set of predictor variables, nine of the 24 attitudinal factors are important. By far the most important predictor variable is TASTE. It explains 18.1 per cent of the variation of the dependent variables as compared to 27.7 per cent for the entire attitudinal set of predictors (Table 6). As in the case of fresh finfish, a favorable attitude toward taste is the major prerequisite for frequent purchase. It may be noted, nonetheless, that fewer people have a favorable attitude toward TASTE in the frozen unprepared finfish market as compared to the fresh finfish market (N=605 vs. N=1227). The element of taste clearly has a stronger consumer appeal in the fresh finfish market than the frozen unprepared finfish market.

The cost differential compared to meats is viewed favorably by nearly 26 per cent of the regular users (Groups 18 and 19). The majority of the regular users, however, regard the cost of frozen unprepared finfish unfavorably

TABLE 8

FROZEN UNPREPARED FINFISH - ATTITUDINAL VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Ȳ)	Attitudinal Characteristics of Respondents FAVORABLE	UNFAVORABLE	% of Original Sample	% of Total Reg. Users	Probability Index
18	150	78.0	TASTE COST PREPARATION		9.7	23.2	2.39
12	73	73.9	TASTE QUALITY IMAGE (2)	COST (C)	4.7	10.7	2.28
16	140	59.3	TASTE QUALITY QUALITY (C)	COST (C) IMAGE (2)	9.1	16.4	1.81
20	123	44.7	TASTE AROMA (C)	COST (C) QUALITY	8.0	10.9	1.36
22	111	43.2	QUALITY PERISHABILITY (C)	TASTE	7.2	9.5	1.32
19	33	39.4	TASTE COST (C)	PREPARATION(C)	2.1	2.6	1.22
17	57	33.3	TASTE QUALITY	COST (C) IMAGE (2) QUALITY (C)	3.7	3.8	1.01
14	181	30.4	APPEARANCE	TASTE QUALITY	11.7	10.8	0.93
23	44	15.9	QUALITY	TASTE PERISHABILITY(C)	2.8	1.4	0.50
15	131	10.7		TASTE QUALITY APPEARANCE	8.4	2.6	0.33
21	29	10.3	TASTE	COST (C) QUALITY AROMA (C)	1.9	0.6	0.31
11	474	8.0		TASTE QUALITY	30.7	7.5	0.25
TOTAL	1546	32.7	N/A		100%	100%	1.00

compared to most meats (Table 8). This attitude points out a potential area of marketing mix adjustment. This dissatisfaction with price is partially offset by favorable attitudes toward the quality of the product by most respondents.

For those respondents with an unfavorable disposition toward taste, the favorable attirbutes of QUALITY, APPEARANCE, and PERISHABILITY (as compared to meats) provide an offsetting effect leading to increased levels of consumption (Groups 6, 14 and 22, Figure 4).

The market segment with the highest probability index is Group 18 (Table 8) at 2.39. This market comprises 9.7 per cent of the original sample but includes 23.2 per cent of those total respondents who are regular frozen unprepared finfish users. The defining attitudinal characteristics for this market segment include the favorable attributes of TASTE, COST (as compared to meats), and PREPARATION (as compared to meats).

The market segment with the lowest probability index is Group 11 (Table 8) at 0.25. This large market segment includes 30.7 per cent of the original sample but contains only 7.5 per cent of those respondents who are regular frozen unprepared finfish consumers. The only two defining attitudes of this terminal group are unfavorable TASTE and unfavorable QUALITY.

FIGURE 4

FROZEN UNPREPARED FISH - ATTITUDINAL VARIABLES

AID TREE
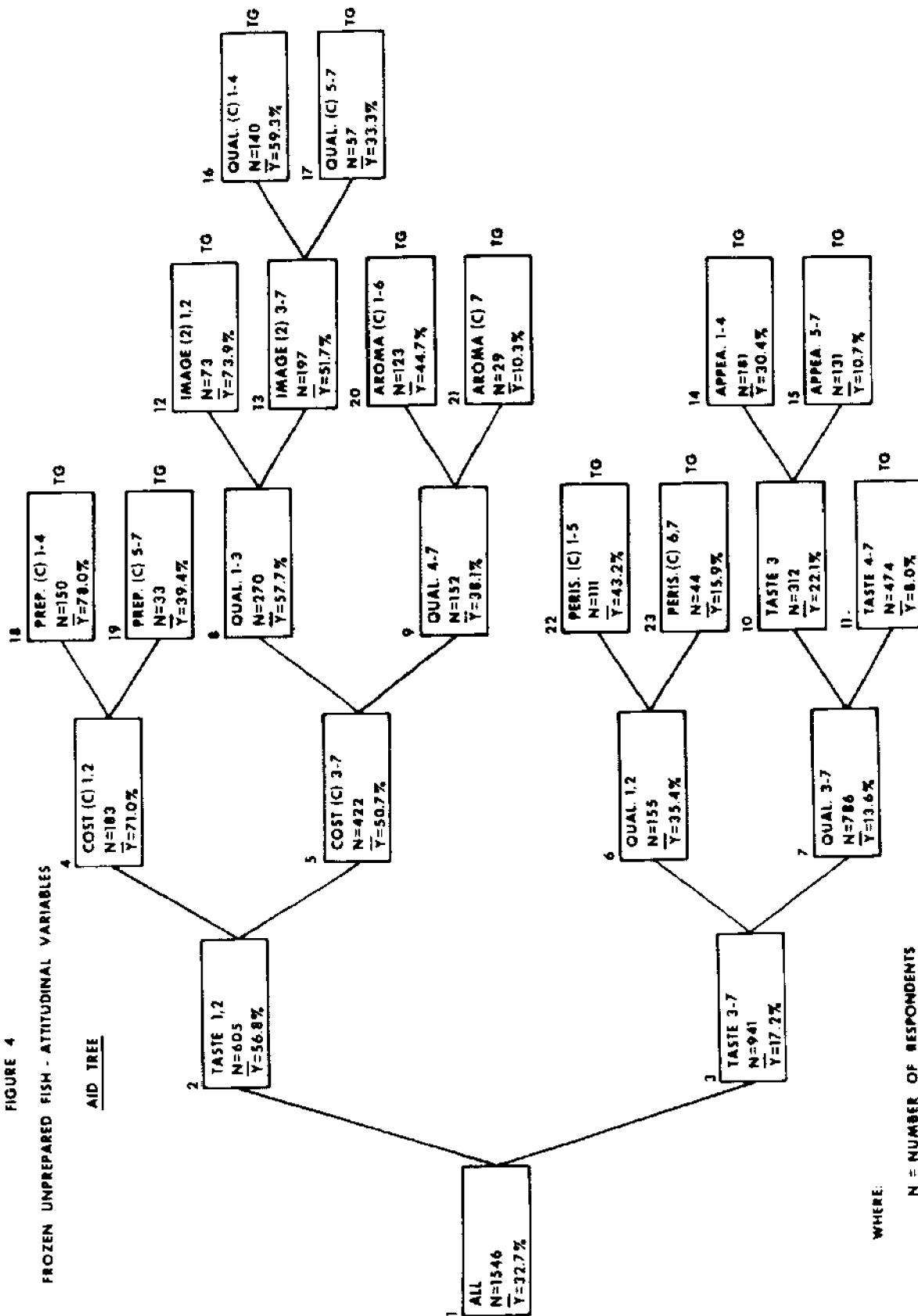
WHERE:

N = NUMBER OF RESPONDENTS

Ȳ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

In summary:

1. The attitudinal variables account for more
    of the variation of the dependent variable
    than the socioeconomic variables (27.7 per
    cent versus 2.0 per cent).

2. TASTE is the most important product attribute
    and represents the basic appeal to the regular
    frozen unprepared finfish user.

3. Given the consumer attitudes toward TASTE
    and QUALITY, the purchase decision is then
    affected by a series of product attribute
    comparisons. Frozen unprepared finfish is
    purchased more frequently by those who
    express favorable dispositions (compared to
    meats) toward the product attributes of a)
    COST, b) PREPARATION, c) AROMA, and d)
    PERISHABILITY.

CHAPTER IV

ANALYSIS OF THE FROZEN PREPARED FINFISH CONSUMER MARKET

The number of cases used in the frozen prepared finfish
consumer market analysis corresponds to 1545 respondents.
The average purchase rate (purchase rate mean) for this
sample is 30.6 per cent or 473 respondents who are classi-
fied as regular users of frozen prepared finfish.

Socioeconomic Variables

Two socioeconomic variables, RELIGION and HOUSEHOLD
SIZE, explain 2.7 per cent of the variation of the dependent
variable (Table 9). This is a coefficient of determination
(R^2) of 0.0270 which is quite low.

The market segment with the highest probability index
(1.48) is characterized by those respondents who are
Catholic and have four or more people in the household
(Table 10). This segment (Group 5) represents 19.5 per cent
of the original sample but contains 28.9 per cent of those
respondents who are regular users of frozen prepared finfish.
The second ranked market segment (Group 4) is also differ-
entiated by the predictor variables of RELIGION and HOUSEHOLD
SIZE. Like Group 5, an identifying characteristic of Group
4 is whether or not they are Catholic or Other (i.e., not
classified as Protestant, Catholic or Jewish); however,
where household size is four or more for Group 5, house-
hold size for Group 4 consists of three or fewer people

per household. This second segment or terminal group consti-
tutes 22.3 per cent of the sample and contains 22.7 per cent
of the regular frozen prepared finfish purchasers, for a
probability index of 1.02. Together, these two market seg-
ments based on the socioeconomic characteristics of RELIGION
and HOUSEHOLD SIZE account for 51.6 per cent of the regular
purchasers of frozen prepared finfish.

The first split of the AID-Tree (Figure 5) is based on
RELIGION. Catholics and Other have a higher average purchase
rate than Jews and Protestants. The greatest percentage of
respondents in these two categories are Catholic. The
residual effect of prior religious tradition (i.e., eating
of fish) appears to be strongest for frozen prepared finfish.
This effect was not identified in either the fresh finfish
or frozen unprepared finfish markets.

A higher average purchase rate is associated with
larger family size (Group 5, Figure 5). One interpretation
might be that larger families purchase frozen prepared finfish
in the form of "fish sticks", thus providing variety to the
family menu at reasonable and often economical prices. This
interpretation applies to all respondents, not just Catholics.
However, the BSS_i/TSS_i value for HOUSEHOLD SIZE in Group 3
(Figure 5) is low, suggesting that the above interpretation,
although logical and of some minor effect, may not be the
case. A more viable explanation is based on the concept of
religious training and background as previously mentioned.

TABLE 9

FROZEN PREPARED FINFISH

SOCIOECONOMIC & ATTITUDINAL VARIABLES

Predictor Rank

Predictor	Explained Variation (%)	Number of Categories
Socioeconomic		
RELIGION	1.7	4
HOUSEHOLD SIZE	1.0	6

Total Explained Variation=2.7% (i.e., R^2=0.0270)

Predictor	Explained Variation (%)	Number of Categories
Attitudinal		
TASTE	13.1	7
IMAGE (1)	1.7	7
WHOLESOME (C)	1.2	7
APPEARANCE	1.1	7
PERISHABILITY	0.8	7
AROMA	0.8	7
TASTE (C)	0.8	7
COST (C)	0.6	7

Total Explained Variation=20.1% (i.e., R^2=0.201)

TABLE 10

FROZEN PREPARED FINFISH - SOCIOECONOMIC VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users ($\bar{Y}$)	Socioeconomic Characteristics of Respondents	% of Original Sample	% of Total Reg. Users	Probability Index
5	302	45.3	a) Catholic or Other b) 4 or More People in Household	19.5	28.9	1.48
4	344	31.1	a) Catholic or Other b) 3 or Less People in Household	22.3	22.7	1.02
3	899	25.5	a) Protestant or Jewish	58.2	48.4	0.83
TOTAL	1545	30.6	N/A	100%	100%	1.00

FIGURE 5

FROZEN PREPARED FISH - SOCIOECONOMIC VARIABLES

AID TREE
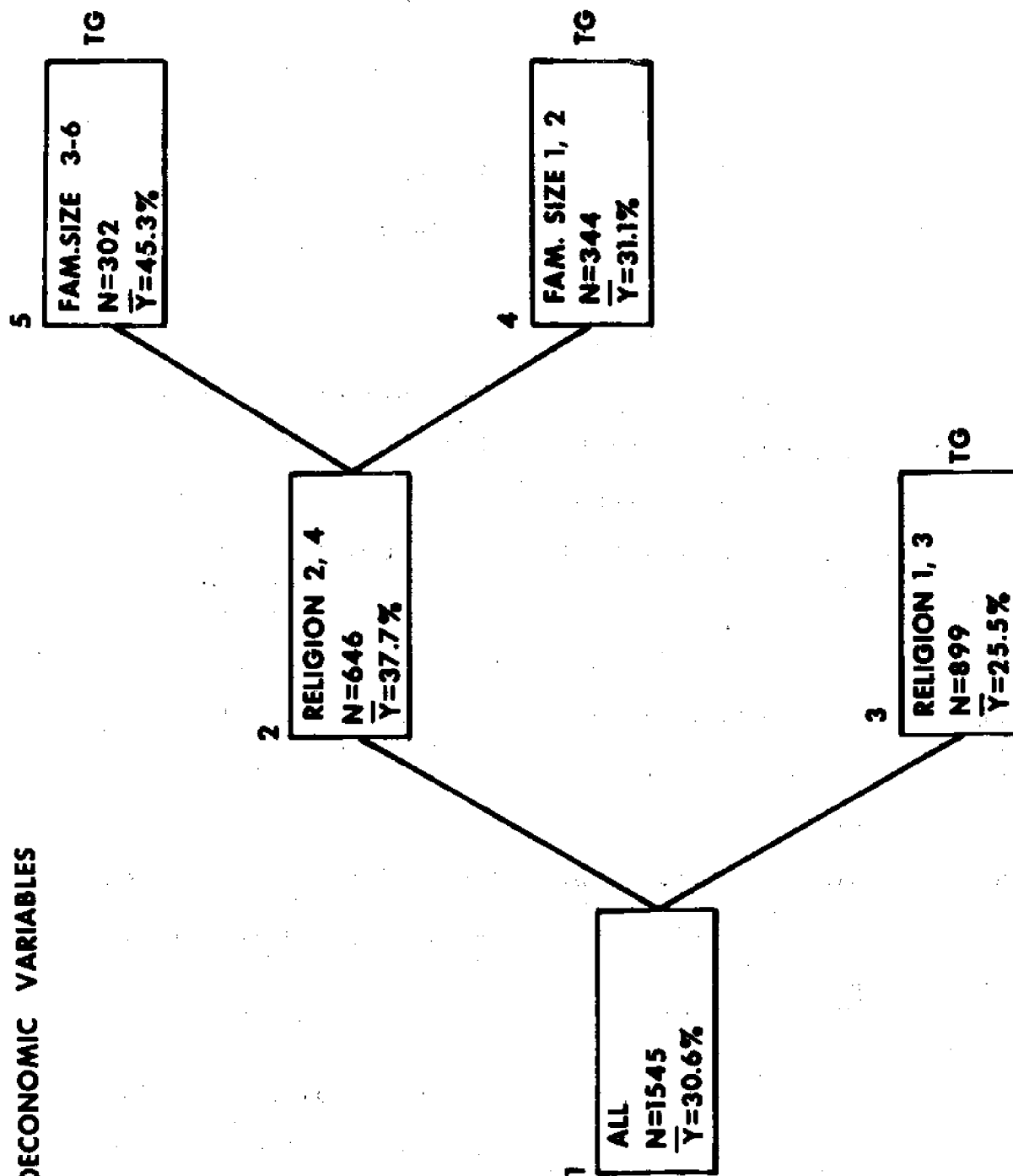
WHERE:

N = NUMBER OF RESPONDENTS

$\overline{Y}$ = PURCHASE RATE MEAN (i.e., % REGULAR . USERS)

TG = TERMINATED GROUP

The larger households would basically correlate with those household units guided by the older and probably more conservative Catholic parents as contrasted to the younger Catholic respondents who are less likely to restrict their eating and purchasing habits. Thus, a higher average purchase rate is associated with the larger family size. This applies to the Catholic subset only.

It is important to note that, although AGE was not used in the splitting process, it was a "competitor variable" in the splitting of Group 2 and the attempted split of Group 3 (Figure 5). The implication is that the AGE effect, although minor, is universal for all respondents. Younger respondents have a higher average purchase rate for frozen prepared finfish. This may possibly be attributed to a combination of convenience in preparation and cooking, menu variability, and economical prices.

In summary:

1. The socioeconomic variables combine to explain 2.7 per cent of the variation of the dependent variable.

2. Catholics with large families (generally representing a more conservative religious view) have a higher average purchase rate for frozen prepared finfish. The residual effect of this traditional fish consumption appears with this fish product and was not seen in the fresh

or frozen unprepared finfish markets.

3. Although of limited effect, younger respondents tend to consume higher levels of frozen prepared finfish. This is contrasted to fresh finfish where younger respondents consumed lower levels.

Attitudinal Variables

The attitudinal variables account for 20.1 per cent of the variation of the dependent variable. The major predictor variable, as in the cases of both the fresh finfish and frozen unprepared finfish markets, is TASTE. This variable accounts for 13.1 per cent of the variation of the dependent variable (Table 9).

Of the eight terminating groups with probability indices of 1.00 or more, three of the market segments accounting for 44.2 per cent of the regular users, rate TASTE favorably. Conversely, five market segments, representing 35.1 per cent of the regular users, rate TASTE unfavorably (Table 11).

Although taste is important, the split of the original sample by this variable indicates that fewer respondents have a favorable disposition toward taste than in either the frozen unprepared or fresh finfish products. Taste is thus important from a quantitative perspective in attaining a satisfactory coefficient of determination, but less impor-tant in defining large market segments with a high probability index. Out of the original sample of 1,545 respondents,

1,179 respondents have a borderline to unfavorable attitude toward TASTE while only 366 have a favorable disposition. The AID-Tree (Figure 6) reveals that most of the defining market segments for the greater part of the original sample are derived from Group 3, which possesses an unfavorable TASTE attitude. The implication is that most people purchase frozen prepared finfish not because of taste considerations but for other factors.

For those respondents with borderline taste attitudes, for example, Group 4 in Figure 6 with resulting terminal Groups 18 and 19, the variables of WHOLESOMENESS (C), AROMA, and IMAGE (1) (special treat for dinner) enter the partitioning process in deriving segments with higher average purchase rates. The 673 respondents (Group 5) with firm unfavorable taste attitudes were subdivided further by IMAGE (1), and then COST (C), or TASTE (C). The resulting market segment (Terminal Group 17) with the lowest probability index (0.35) includes 565 respondents representing 36.6 per cent of the cases but contains only 12.7 per cent of those respondents who are regular users. Approximately one-third of the respondents, consequently, view this product as a poor tasting, inferior meal food item, and this view is accompanied by a corresponding low average purchase rate ($Y=10.6$ per cent).

For those individuals with favorable taste dispositions, the product attributes of appearance and perishability provide

further segmentation resulting in Group 14 (Table 11) with
the highest probability index (2.75). These respondents
rate frozen prepared finfish as a very tasty product, good
in appearance with low susceptibility to spoilage. However,
this group represented only 3.0 per cent of the cases and
8.2 per cent of the regular purchasers.

Lack of symmetry in the AID-Tree (Figure 6) indicates
that interaction dominates the splitting process. Groups
2, 8, and 14 in series represent a set of cumulative
advantages, while Groups 3, 5, 11, and 17 represent a set
of cumulative disadvantages.

In summary:

1. The attitudinal variables account for more of
   the variation of the dependent variable than
   the socioeconomic variables (20.1 per cent
   to 2.7 per cent).

2. Approximately one-third of the original sample
   respondents view frozen prepared finfish as
   an extremely poor tasting product with a bad
   image as a menu item.

3. A favorable disposition to taste results in
   higher purchase frequencies, but is applicable
   to fewer respondents than either fresh or
   frozen unprepared finfish. These resultant
   market segments are thus small in number of
   respondents.

4. Those nontaste characteristics which lead to increased frozen prepared finfish consumption are the positive appearance of the product, superior preservation properties, favorable aroma, and wholesomeness (safe to eat). A favorable cost differential over meats is also expressed, although of minor importance.

TABLE 11

FROZEN PREPARED FINFISH - ATTITUDINAL VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Ȳ)	Attitudinal Characteristics of Respondents FAVORABLE	UNFAVORABLE	% of Original Sample	% of Total Reg. Users	Probability Index
14	46	84.7	TASTE APPEARANCE PERISHABILITY		3.0	8.2	2.75
18	36	58.3	AROMA IMAGE (1)	TASTE WHOLESOME (C)	2.3	4.4	1.92
15	235	58.3	TASTE APPEARANCE	PERISHABILITY	15.2	29.0	1.91
20	29	55.1	IMAGE (1) COST (C)	TASTE	1.9	3.4	1.78
6	114	49.1	WHOLESOME	TASTE	7.4	11.8	1.60
9	85	38.8	TASTE	APPEARANCE	5.5	7.0	1.27
16	40	37.5	TASTE (C)	TASTE IMAGE (1)	2.6	3.2	1.22
19	188	30.8	AROMA	TASTE WHOLESOME (C) IMAGE (1)	12.2	12.3	1.01
21	39	20.5	IMAGE (1)	TASTE COST (C)	2.4	1.6	0.68
13	168	18.4		TASTE WHOLESOME (C) AROMA	10.9	6.4	0.65
17	565	10.6		TASTE IMAGE (1) TASTE (C)	36.6	12.7	0.35
TOTAL	1545	30.7		N/A	100%	100%	1.00

FIGURE 6

FROZEN PREPARED FISH - ATTITUDINAL VARIABLES
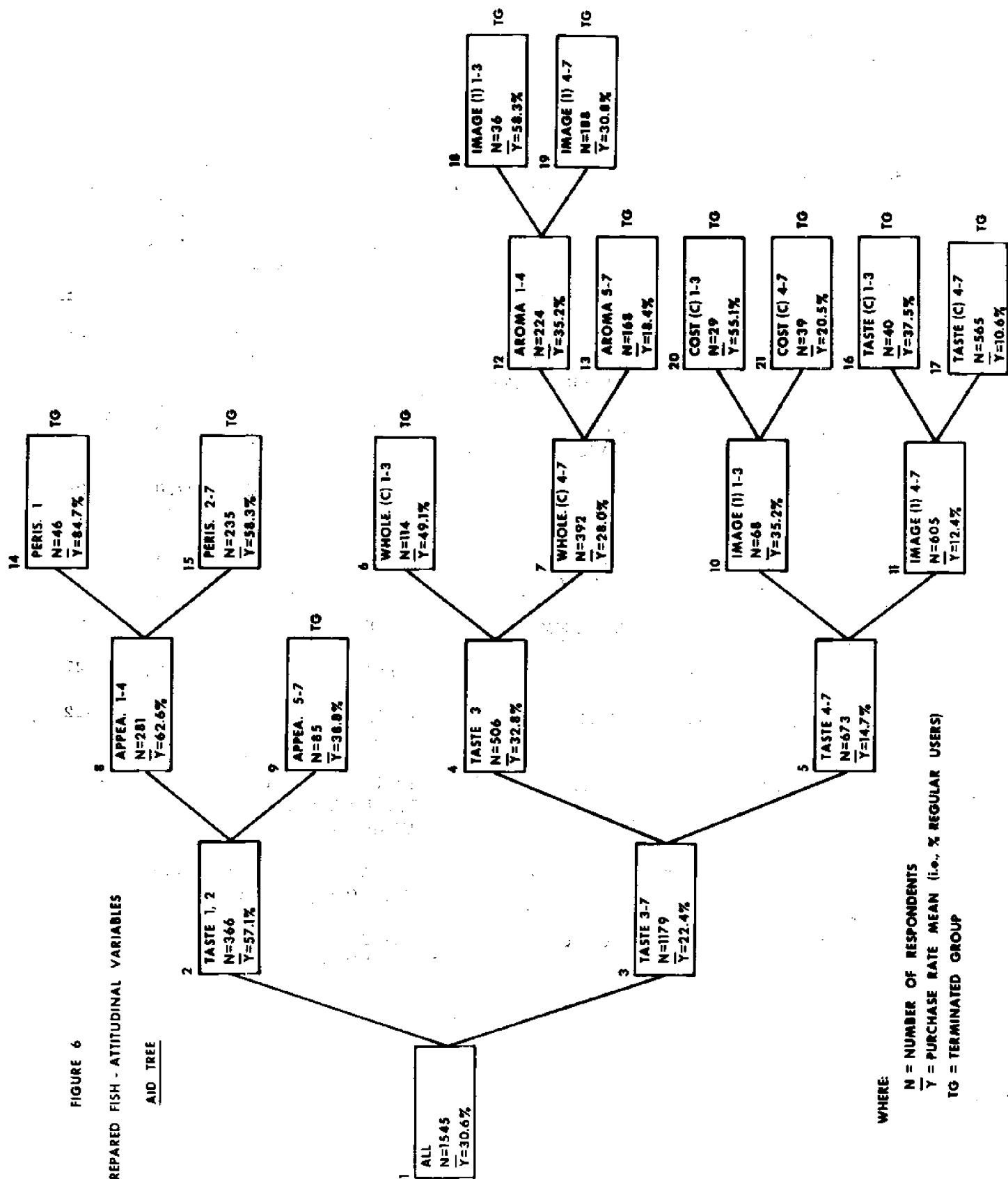
AID TREE

WHERE:

N = NUMBER OF RESPONDENTS

Ȳ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

CHAPTER V

ANALYSIS OF THE FRESH SHELLFISH CONSUMER MARKET

The number of cases used in the fresh shellfish market analysis corresponds to 1534 respondents. The average purchase rate (purchase rate mean) for this sample is 17.8 per cent or 273 respondents who are classified as regular users of fresh shellfish.

Socioeconomic Variables

The four socioeconomic predictor variables of INCOME, AGE, RACE, and OCCUPATION explain 4.3 per cent of the variation among regular and irregular purchasers of fresh shellfish (Table 12). The sample is split initially on INCOME (Figure 7). Respondents with an annual income of $8,000 or more have a higher average purchase rate than those with lower incomes (19.7 per cent versus 12.2 per cent). This is not unusual, given the higher prices· associated with most fresh shellfish products. Those who buy more are those with greater discretionary incomes.

The higher income group (Group 3, Figure 7) is further subdivided by the AGE variable. Those respondents who are 46 years of age or older have a higher average purchase rate than the younger. This is equally true for all races. The difference between the average purchase rates, however, is large (25.6 per cent versus 15.3 per cent). This indicates that, even if younger families have an adequate income, they still purchase less fresh shellfish. The same

effect (lower average purchase rate with lower age) was also observed for fresh finfish. The convenience and presumed quality of frozen seafood may be factors affecting this purchasing behavior. Inadequate supplies and limited distribution may also hinder the use of fresh seafoods. Whatever the cause, younger consumers are buying less fresh seafoods than the elderly.

A further split on this "AID-Tree branch" (Group 5) is made by the OCCUPATION variable. Interestingly, 38 per cent of the retired elderly respondents with middle to high income are regular purchasers of fresh shellfish (Group 6, Table 13). This market segment represents a small proportion of the total market (5.3 per cent) but contained 11.4 per cent of the regular users. Evidently, the strong preference and taste for fresh shellfish can now be accommodated by the more affluent retiree.

The remaining respondents from the above split (Group 7, Figure 7) are split further by the INCOME variable. A higher average purchase rate is evident for those individuals with a high income ($14,000 or more). This is merely an extension of the income effect and represents increased purchases of fresh shellfish--commonly viewed as a "premium" or luxury food product--by those who can best afford such a purchase.

The RACE variable partitions that group of younger respondents with middle to high incomes (Group 4, Figure 7).

Negroes have a higher average purchase rate than non-Negroes. This market segment is small, however, representing only 2.2 per cent of the original sample.

All of the resulting market segments are summarized on Table 13. Those three segments with probability indexes greater than 1.00 account for 18.7 per cent of the original sample but contain 35.9 per cent of those respondents who are regular users of fresh shellfish.

In summary:

1. The four socioeconomic variables of INCOME, AGE, RACE, and OCCUPATION combine to explain 4.3 per cent of the variation of the dependent variable.

2. Higher average purchase rates are observed for those individuals with larger incomes.

3. As in the case of the fresh finfish, fresh shellfish is less likely to be bought by younger respondents.

4. Negroes and retired persons with higher incomes are also more likely to be regular purchasers of fresh shellfish.

Attitudinal Variables

Six of the 24 attitudinal predictor variables account for 14.9 per cent of the variation of the dependent variable. Those four market segments (Table 14) with probability indexes greater than 1.00 represent 32.7 per cent of the

TABLE 12

FRESH SHELLFISH
SOCIOECONOMIC & ATTITUDINAL VARIABLES

Predictor Rank

Predictor	Explained Variation (%)	Number of Categories
Socioeconomic		
INCOME	1.5	7
AGE	1.3	6
RACE	0.8	3
OCCUPATION	0.7	7

Total Explained Variation=4.3% (i.e., R^2=0.043)

Attitudinal		
TASTE (C)	7.0	7
TASTE	2.4	7
PREPARATION	1.9	7
APPEARANCE (C)	1.7	7
AROMA	1.1	7
COOKING	0.8	7

Total Explained Variation=14.9% (i.e., R^2=0.149)

FIGURE 7

FRESH SHELL - SOCIOECONOMIC VARIABLES
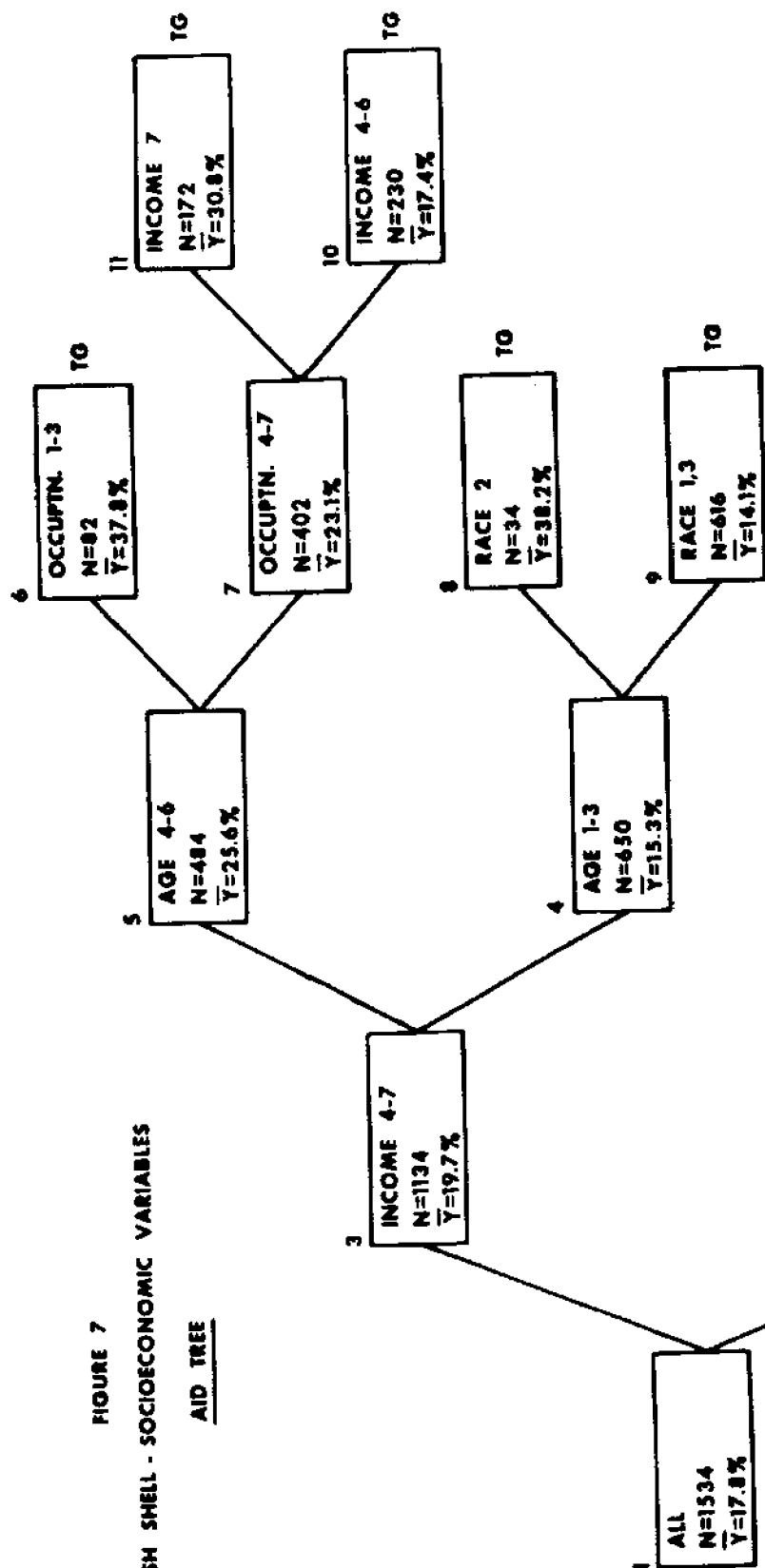
AID TREE

WHERE:

N = NUMBER OF RESPONDENTS

Ȳ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

TABLE 13

FRESH SHELLFISH - SOCIOECONOMIC VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Y)	Socioeconomic Characteristics of Respondents	% of Original Sample	% of Total Reg. Users	Probability Index
8	34	38.2	a) Middle to High Income b) Under 45 Yrs. of Age c) Negro	2.2	4.8	2.16
6	82	37.8	a) Middle to High Income b) Over 45 Yrs. of Age c) Lower Occupation Level (non-professional)	5.3	11.4	2.14
11	172	30.8	a) High Income b) Over 45 Yrs. of Age c) Higher Occupation Level (professional)	11.2	19.7	1.73
10	230	17.4	a) Middle Income b) Over 45 Yrs. of Age c) High Occupation Level (professional)	15.0	14.7	0.98
9	616	14.1	a) Middle to High Income b) Under 45 Yrs. of Age c) Non-Negro	40.2	31.8	0.78
2	400	12.2	a) Low Income	26.1	17.6	0.67
TOTAL	1534	17.8	N/A	100%	100%	1.00

TABLE 14

FRESH SHELLFISH - ATTITUDINAL VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Ȳ)	Attitudinal Characteristics of Respondents FAVORABLE	UNFAVORABLE	% of Original Sample	% of Total Reg. Users	Probability Index
6	136	47.8	TASTE (C) PREPARATION AROMA		8.9	23.8	2.68
10	69	37.6	TASTE (C) APPEARANCE(C)	PREPARATION	4.5	9.5	2.12
14	137	35.7	TASTE (C) PREPARATION APPEARANCE (C)	AROMA	8.9	17.9	2.02
12	160	26.2	TASTE COOKING	TASTE (C)	10.4	15.6	1.48
11	283	17.6	TASTE (C)	PREPARATION APPEARANCE(C)	18.5	18.1	0.97
15	52	15.3	TASTE(C) PREPARATION	AROMA APPEARANCE(C)	3.4	3.0	0.86
13	174	11.5	TASTE	TASTE(C) COOKING	11.3	7.3	0.65
9	523	2.5		TASTE(C) TASTE	34.1	4.8	0.14
TOTAL	1534	17.8	N/A		100%	100%	1.00

sample but contain 66.8 per cent of those respondents who are regular users of fresh shellfish.

The most important predictor variable is TASTE (C), that is, taste compared to meat. Respondents who consider the taste of fresh shellfish superior to the taste of meat are much more likely to be regular users of fresh shellfish than those who do not prefer the taste of fresh shellfish compared to meat (29.2 per cent versus 8.7 per cent). The group with a taste preference for fresh shellfish is alrge and represents 677 respondents or 43.7 per cent of the original sample. An additional 334 respondents or 39.0 per cent rate the taste of fresh shellfish equal to but not better than meat. The remaining 523 respondents feel the taste of fresh shellfish is poor--both by itself and in comparison to meats. This market segment represents 34.1 per cent of the sample but contains only 4.8 per cent of the regular users. Favorable attitudes toward the preparation, aroma, and cooking of fresh shellfish as well as appearance compared to meat are additional variables on which terminal groups with higher proportions of regular users are segmented. The former two attributes (preparation and aroma) combine with the taste preference for fresh shellfish (as compared to meats) to form that market segment with the highest probability index (2.68). This group (Group 6, Table 14) represents 8.9 per cent of the original sample but contains 23.8 per cent of those respondents who are regular users. An examination of

FIGURE 8

FRESH SHELL - ATTITUDINAL VARIABLES

AID TREE

```
                                                                    6 ┌─────────┐
                                                                      │ AROMA 1,2│ TG
                                                                      │ N=136   │
                                            4 ┌─────────┐             │ Ȳ=47.8% │
                                              │ PREP. 1,2│────────────┤         │
                                              │ N=325   │             └─────────┘
                                              │ Ȳ=37.5% │             7 ┌─────────┐
                                              │         │             │ AROMA 3-7│ TG
                       2 ┌──────────┐         └─────────┘             │ N=189   │
                         │ TASTE (C) │─────────                       │ Ȳ=30.1% │
                         │ 1-3      │                                 └─────────┘
                         │ N=677    │                                 10 ┌─────────┐
                         │ Ȳ=29.2%  │        5 ┌─────────┐              │ APPEA. (C) 1,2│ TG
                         └──────────┘          │ PREP. 3-7│             │ N=69    │
                                              │ N=352   │─────────────┤ Ȳ=37.6% │
    ┌──────────┐                              │ Ȳ=21.6% │             └─────────┘
    │ ALL      │                              └─────────┘             11 ┌─────────┐
    │ N=1534   │                                                        │ APPEA. (C) 3-7│ TG
    │ Ȳ=17.8%  │                                                        │ N=283   │
    └──────────┘                                                        │ Ȳ=17.6% │
                                              8 ┌─────────┐             └─────────┘
                         3 ┌──────────┐         │ TASTE 1,2│            12 ┌─────────┐
                         │ TASTE (C) │─────────│ N=334   │             │ COOK. 1,2│ TG
                         │ 4-7      │          │ Ȳ=18.5% │─────────────┤ N=160   │
                         │ N=857    │          └─────────┘             │ Ȳ=26.2% │
                         │ Ȳ=9.7%   │                                  └─────────┘
                         └──────────┘                                  13 ┌─────────┐
                                                                        │ COOK. 3-7│ TG
                                              9 ┌─────────┐             │ N=174   │
                                                │ TASTE 3-7│            │ Ȳ=11.5% │
                                                │ N=523   │ TG          └─────────┘
                                                │ Ȳ=2.5%  │
                                                └─────────┘
```

14 APPEA. (C) 1-4 N=137 Ȳ=35.7% TG

15 APPEA. (C) 5-7 N=52 Ȳ=15.3% TG
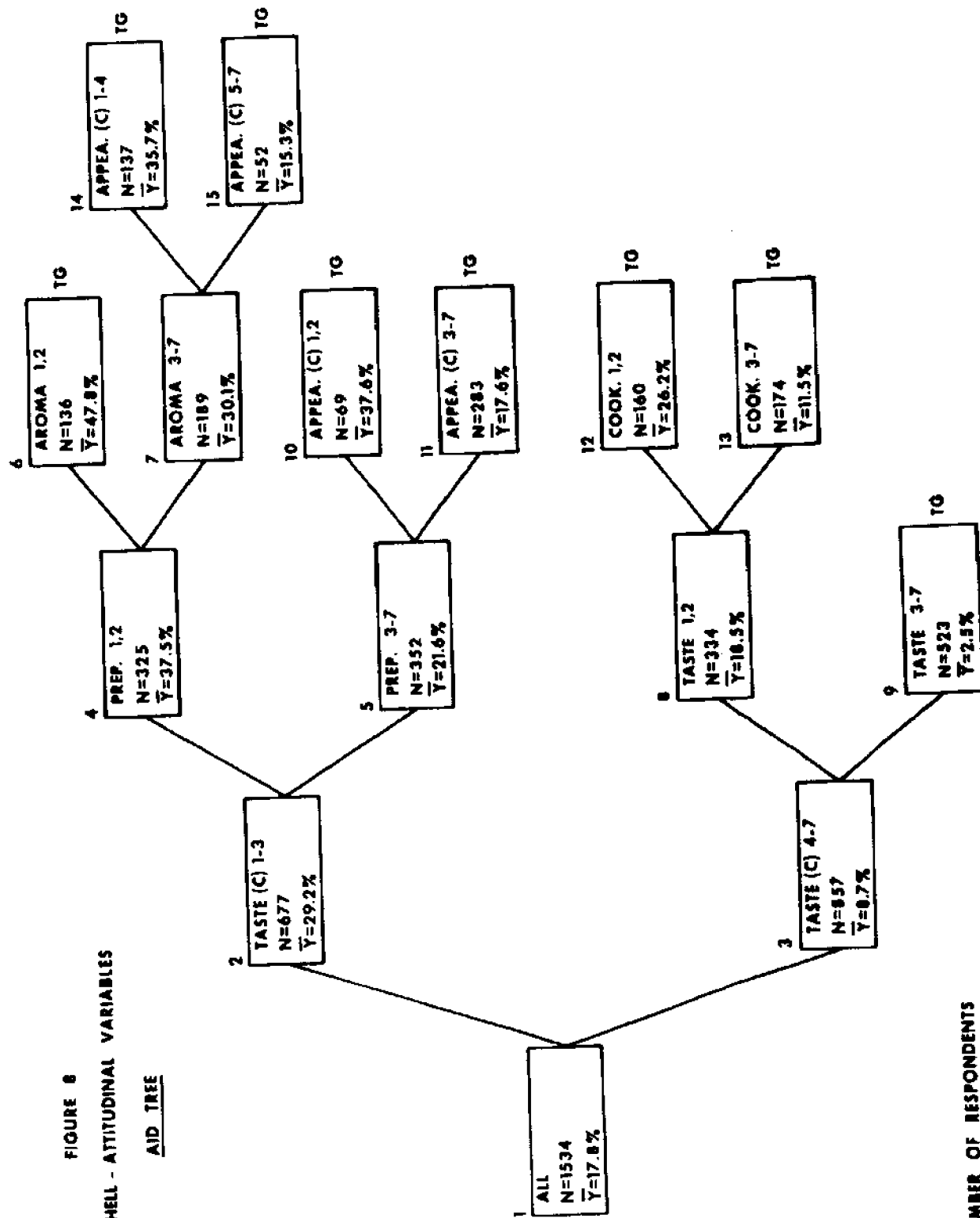
WHERE:

N = NUMBER OF RESPONDENTS

Ȳ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

supportive splitting statistics reveals that this group is almost split further by the IMAGE (2) (guest meal) variable. Although of minor effect, consumer purchases of fresh shellfish are oftimes made to provide a prestigious menu offering for guests.

Lack of symmetry in the AID-Tree indicates extensive interaction in the splitting process. Cumulative advantages are found in Groups 2, 4, and 6 while cumulative disadvantages are found in Groups 3 and 9 (Figure 8). Alternating advantages and disadvantages provide the other interacting process.

In summary:

1. The attitudinal variables account for more of the variation of the dependent variable than the socioeconomic variables (14.9 per cent versus 4.3 per cent).

2. TASTE (C) and TASTE are extremely definitive predictor variables in determining purchase rate behavior. The product attribute of TASTE continues to dominate the logical explanations of consumer buying behavior in all four fish products discussed this far. As will be seen, a similar dominance will equally apply to the remaining fish product markets.

3. Besides TASTE, favorable attitudes toward
   PREPARATION, AROMA, COOKING, APPEARANCE
   (as compared to meats), and IMAGE (as a menu
   offering for guests) provide segmentation
   leading to higher average purchase rates.

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CHAPTER VI

ANALYSIS OF THE FROZEN UNPREPARED SHELLFISH CONSUMER MARKET

The number of cases used in the frozen unprepared
shellfish consumer market analysis corresponds to 1534
respondents. The average purchase rate (purchase rate
mean) for this sample is 13.3 per cent or 205 respondents
who are classified as regular users of frozen unprepared
shellfish.

Socioeconomic Variables

One socioeconomic predictor variable is utilized in
the splitting process. This variable, INCOME, explains only
0.7 per cent of the variation of the dependent variable
(Table 15). It is indicative of the fact that respondents
with higher incomes are more likely to be regular users of
frozen unprepared shellfish. This same discriminatory
effect was also apparent for fresh shellfish (Table 13).

Those respondents having higher incomes (Group 3,
Figure 9) are almost split by OCCUPATION. Those respondents
who are professionals or generally classified as white
collar employees consume higher levels of frozen unprepared
shellfish than their high-income blue collar counterparts.
This may imply the social conditioning of the professional
or white collar worker who would regard this product as
having menu status. The blue collar worker would not be
so inclined.

In summary:

1. One predictor variable, INCOME, accounts for 0.7 per cent of the variation of the dependent variable. Correlation is low between the socioeconomic variable set and frequency of purchase.

2. Higher income respondents have higher average purchase rates. Further discrimination is based on occupation, although of minor effect. Professional or white collar workers tend to consume more frozen unprepared shellfish than high income blue collar workers.

Attitudinal Variables

Six attitudinal predictor variables combine to explain 13.1 per cent of the variation of the dependent variable. The most important of the six variables is TASTE. Again the power of this variable in identifying regular purchasers of fish products is demonstrated. About one-third of the 1534 respondents express a positive attitude towards the taste attribute. Even higher proportions of regular purchasers are found among those respondents who expressed, in addition to favorable taste characteristics, a positive disposition toward the product attributes of cooking, wholesomeness (as compared to meats), and menu status for guests (Group 4, 6, and 16, Figure 10).

TABLE 15

FROZEN UNPREPARED SHELLFISH
SOCIOECONOMIC & ATTITUDINAL VARIABLES

Predictor Rank

Predictor	Explained Variation (%)	Number of Categories
Socioeconomic		
INCOME	0.7	7

Total Explained Variation=0.7% (i.e., R^2=0.007)

Attitudinal		
TASTE	6.0	7
COOKING	2.3	7
IMAGE (2)	2.2	7
COST (C)	0.9	7
AROMA (C)	0.9	7
WHOLESOME (C)	0.8	7

Total Explained Variation=13.1% (i.e., R^2=0.131)

TABLE 16

FROZEN UNPREPARED SHELLFISH

SOCIOECONOMIC VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users ($\overline{Y}$)	Socioeconomic Characteristics of Respondents	% of Original Sample	% of Total Reg. Users	Proba- bility Index
3	455	17.8	a) High Income	29.7	39.5	1.34
2	1079	11.5	a) Middle to Low Income	70.3	60.5	0.86
TOTAL	1534	13.3	N/A	100%	100%	1.00

FIGURE 9

FROZEN UNPREPARED SHELL - SOCIOECONOMIC VARIABLES

AID TREE
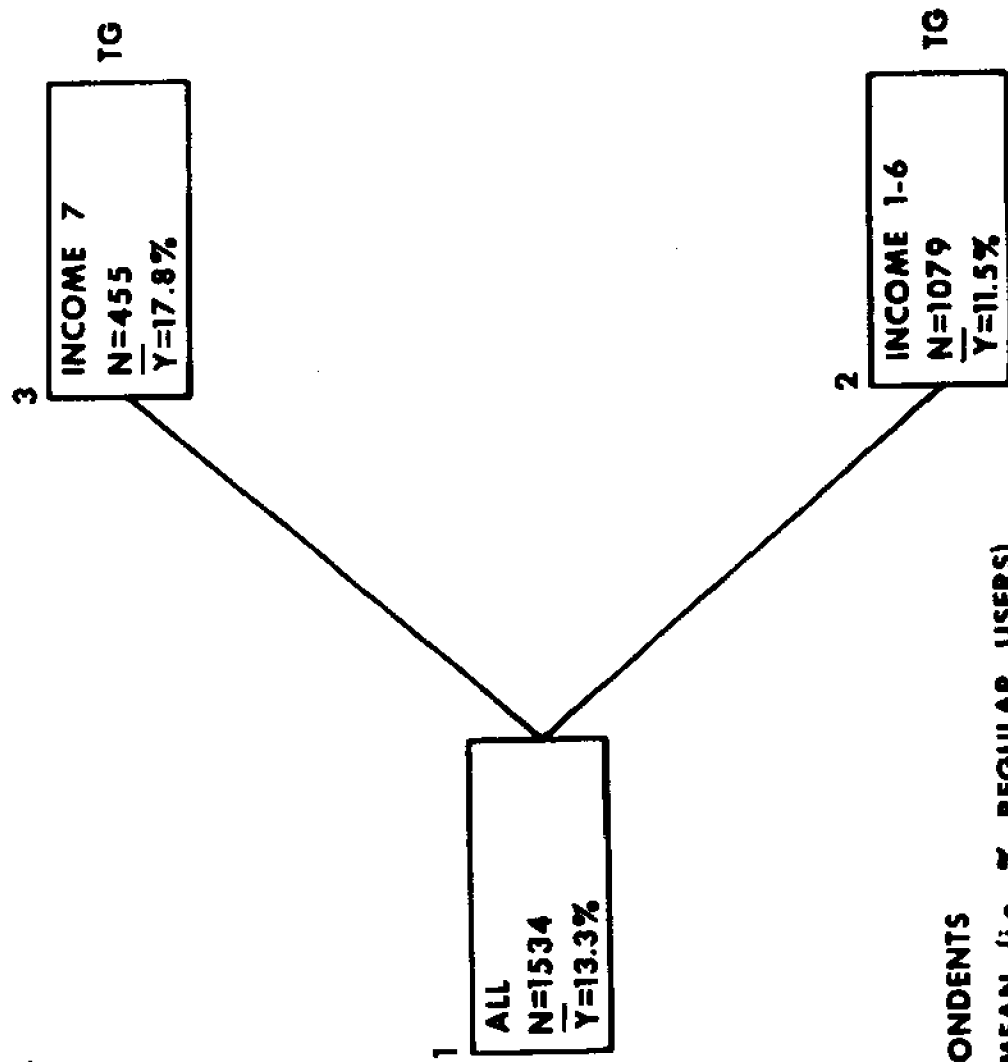
WHERE:

N = NUMBER OF RESPONDENTS

$\overline{Y}$ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

From Group 3 (Figure 10) it may be seen that most people who do not like the taste of frozen unprepared shellfish buy such a product because of the menu status that this product enjoys, especially when guests are involved. This effect is not observed in the fresh shellfish market, and indicates that sales of shellfish for menu status purposes is mainly of the frozen unprepared type. Those who do purchase this product for nontaste reasons do so primarily for convenience and quality (frozen form), while at the same time providing menu status and satisfaction.

Another variable which has predictive effect is COOKING. It appears in both the favorable and the nonfavorable taste respondents' sections of the AID Tree indicating its independence of the taste variable. Those who feel frozen unprepared shellfish is easy to cook have higher average purchase rates (Groups 4 and 14, Figure 10).

Other variables, although of minor effect but utilized in the splitting process, are comparisons to meat, namely, WHOLESOMENESS (C), and AROMA (C).

Lastly, while the two variables, TASTE and IMAGE (2) (guest meal), provide discrimination leading to market segments with higher average purchase rates, these segments do not represent a majority of respondents. Group 9 (Table 17), for instance, contains 43.7 per cent of the original sample which was split unfavorably on TASTE and IMAGE (2), but represents only 10.8 per cent of total

FIGURE 10

FROZEN UNPREPARED SHELL - ATTITUDINAL VARIABLES

AID TREE
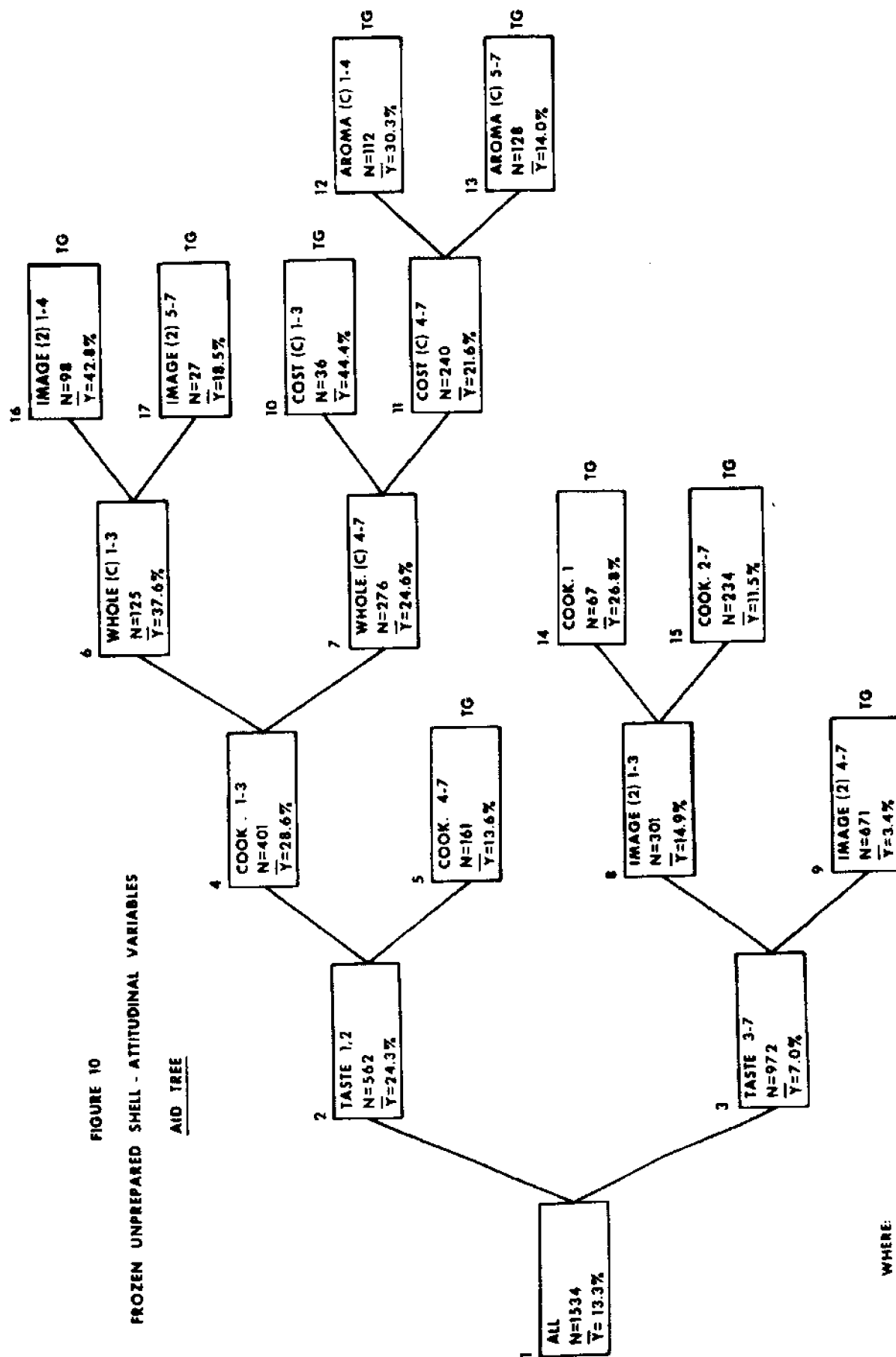
WHERE:

N = NUMBER OF RESPONDENTS

Ȳ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

regular users of frozen unprepared shellfish. This results
in a probability index of 0.25. These respondents view
frozen prepared shellfish as bad-tasting and inadequate for
dinner entertainment purposes. Clearly, most regular
frozen prepared shellfish users are split into small segments
of the original sample with a variety of specific character-
istics as shown in Table 17.

The unsymmetric AID-Tree indicates significant interaction.
Groups 2, 4, 6, and 16 form a series of cumulative advantages,
while Groups 3 and 9 (Figure 10) form a series of cumulative
disadvantages.

In summary:

1. The attitudinal variables account for more
    of the variation of the dependent variable
    than the socioeconomic variables (13.1 per
    cent versus 0.7 per cent).

2. The most important variable is TASTE which
    explains 6.0 per cent of the variations of
    the dependent variable. The majority of
    respondents, however, reported unfavorable
    dispositions to the TASTE attribute.

3. Despite unfavorable predispositions toward
    TASTE, a substantial number of these
    respondents purchased frozen unprepared
    shellfish to provide menu status for dinner
    guests.

TABLE 17

FROZEN UNPREPARED SHELLFISH - ATTITUDINAL VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users ($\bar{Y}$)	Attitudinal Characteristics of Respondents FAVORABLE	UNFAVORABLE	% of Original Sample	% of Total Reg. Users	Probability Index
10	36	44.4	TASTE COOKING COST (C)	WHOLESOME (C)	2.3	7.8	3.41
16	98	42.8	TASTE COOKING WHOLESOME (C) IMAGE (2)		6.4	20.7	3.22
12	112	30.3	TASTE COOKING AROMA (C)	WHOLESOME (C) COST (C)	7.3	16.9	2.28
14	67	26.3	IMAGE (2) COOKING	TASTE	4.4	8.9	2.00
17	27	18.5	TASTE COOKING WHOLESOME (C)	IMAGE (2)	1.8	2.6	1.36
13	128	14.0	TASTE COOKING	WHOLESOME (C) COST (C) AROMA (C)	8.3	8.8	1.06
5	161	13.6	TASTE	COOKING	10.5	10.3	0.98
15	234	11.5	IMAGE (2)	TASTE COOKING	15.3	13.2	0.86
9	671	3.4		TASTE IMAGE (2)	43.7	10.8	0.25
TOTAL	1534	13.3	N/A		100%	100%	1.00

4. Favorable attitudes toward the product
   attributes of COOKING, COST (as compared to
   meats), WHOLESOMENESS (as compared to meats),
   and AROMA (as compared to meats) resulted in
   higher average purchase rates, but whose
   predictive effect is minimal.

CHAPTER VII

ANALYSIS OF THE FROZEN PREPARED SHELLFISH CONSUMER MARKET

The number of cases used in the frozen prepared shell-
fish consumer market analysis corresponds to 1535 respondents.
The average purchase rate (purchase rate mean) for this sample
is 15.1 per cent or 231 respondents who are classified as
regular users of frozen prepared shellfish.

Socioeconomic Variables

None of the individual socioeconomic variables has suffi-
cient predictive ability to satisfy minimally the splitting
control criteria. The implication is that little relationship
exists between the socioeconomic predictor variable set (as
defined) and the purchase frequency of frozen prepared shellfish.

Attitudinal Variables

Four predictor attitudinal variables on the other hand,
combine to explain 13.8 per cent of the variation of the
dependent variable (Table 18). The most important variable
once again is TASTE (Table 19). Respondents with a favorable
attitude toward TASTE are more likely to be regular users of
frozen prepared shellfish (Groups 2 and 4, Figure 11).
However, the major discriminatory effect of the TASTE
variable may be seen in the larger resultant market segments
who view frozen prepared shellfish as a poor-tasting product,
and consequently, have few regular purchasers in these
groups. This is readily apparent in Group 5 (Figure 11)

which contains approximately one-half of the original sample respondents (N=754 vs. N=1535) of whom only 5.4 per cent are regular users. Nearly all of the respondents in this group consider frozen prepared shellfish untasty.

Several other attitudinal variables have minor predictive ability. The product attributes of WHOLESOMENESS, QUALITY and COOKING are preferred over meat by certain respondents. However, as in the case of the TASTE attribute, the resultant market segments are small.

An interesting observation is that unfavorable ratings on the product attributes of WHOLESOMENESS and QUALITY compared to meat serve to reduce the average purchase rate of the market segment (Group 2, Figure 11) which regards TASTE as quite desirable. Approximately 70 per cent of those respondents who favor TASTE have these reservations. Their average purchase rates are lower as a result.

Those respondents who view frozen prepared shellfish as tasty are a small yet significant percentage (25%) of the original sample. Even higher average purchase rates could be obtained if suppliers could dispel certain negative attitudes regarding WHOLESOMENESS and take measures to insure QUALITY of product. The potential for such payout may be seen in those higher purchase rate levels associated with respondents who possess these positive attitudes (Groups 6 and 8, Figure 11).

The unsymmetric AID-Tree indicates a predominance of interaction among predictor variables. Groups 2, 6, and 10 form a series of cumulative advantages, while Groups 3 and 5 (Figure 11) form a series of cumulative disadvantages.

In summary:

1. The attitudinal variables account for 13.8 per cent of the variation of the dependent variable whereas the socioeconomic variables account for 0.0 per cent within the control parameters utilized.

2. As in the case of frozen unprepared shellfish, TASTE is the most important predictor variable. Favorable dispositions to TASTE lead to higher average purchase rates, although concerns about the WHOLESOMENESS and QUALITY of frozen prepared shellfish (as compared to meats) offset this effect.

TABLE 18

FROZEN PREPARED SHELLFISH - ATTITUDINAL VARIABLES

Predictor Rank

Predictor	Explained Variation (%)	Number of Categories
Attitudinal		
TASTE	9.4	7
WHOLESOME(C)	2.3	7
COOKING(C)	1.1	7
QUALITY(C)	1.0	7

Total Explained Variation=13.8% (i.e., $R^2=0.138$)

TABLE 19

FROZEN PREPARED SHELLFISH ~ ATTITUDINAL VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users ($\bar{Y}$)	Attitudinal Characteristics of Respondents FAVORABLE	UNFAVORABLE	% of Original Sample	% of Total Reg. Users	Probability Index
10	39	69.2	TASTE WHOLESOME (C) COOKING (C)		2.5	11.8	4.68
8	27	51.8	TASTE QUALITY (C)	WHOLESOME (C)	1.8	6.2	3.36
11	49	38.7	TASTE WHOLESOME (C)	COOKING (C)	3.2	8.4	2.57
9	270	24.0	TASTE	WHOLESOME (C) QUALITY (C)	17.6	27.9	1.57
4	396	16.6	TASTE	TASTE	25.8	28.3	1.09
5	754	5.4		TASTE	49.1	17.4	0.35
TOTAL	1535	15.1	N/A		100%	100%	1.00

FIGURE 11

FROZEN PREPARED SHELL - ATTITUDINAL VARIABLES

AID TREE

```
                                    ┌──────────────┐
                                  1 │ ALL          │
                                    │ N=1535       │
                                    │ Y̅=15.1%      │
                                    └──────────────┘
                          ┌───────────────┴───────────────┐
              ┌──────────────┐                      ┌──────────────┐
            2 │ TASTE 1, 2   │                    3 │ TASTE 3-7    │
              │ N=385        │                      │ N=1150       │
              │ Y̅=32.4%      │                      │ Y̅=9.3%       │
              └──────────────┘                      └──────────────┘
          ┌────────┴────────┐                    ┌────────┴────────┐
  ┌──────────────┐   ┌──────────────┐    ┌──────────────┐   ┌──────────────┐
6 │ WHOLE.(C) 1,2│ 7 │ WHOLE.(C) 3-7│  4 │ TASTE 3    TG│ 5 │ TASTE 4-7  TG│
  │ N=88         │   │ N=297        │    │ N=396        │   │ N=754        │
  │ Y̅=52.2%      │   │ Y̅=26.6%      │    │ Y̅=16.6%      │   │ Y̅=5.4%       │
  └──────────────┘   └──────────────┘    └──────────────┘   └──────────────┘
  ┌────┴─────┐       ┌────┴─────┐
┌───────┐ ┌───────┐┌───────┐ ┌───────┐
│COOK.  ││COOK.  ││QUAL.  │ │QUAL.  │
│(C) 1  ││(C) 2-7││(C) 1,2│ │(C) 3-7│
│N=39 TG││N=49 TG││N=27 TG│ │N=270TG│
│Y̅=69.2%││Y̅=38.7%││Y̅=51.8%││Y̅=24.0%│
└───────┘ └───────┘└───────┘ └───────┘
  10        11       8         9
```

WHERE:

N = NUMBER OF RESPONDENTS

Y̅ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

CHAPTER VIII

ANALYSIS OF THE CANNED FISH CONSUMER MARKET

The number of cases used in the canned fish consumer
market analysis corresponds to 1536 respondents. The
average purchase rate (purchase rate mean) for this sample
is 62.3 per cent or 957 respondents who are classified as
regular users of canned fish.

Socioeconomic Variables

Three socioeconomic variables combine to explain
5.1 per cent of the variation of the dependent variable
(Table 20). These predictor variables are HOUSEHOLD SIZE,
OCCUPATION, and RELIGION.

The most important of these variables on which the AID
program made its first split is HOUSEHOLD SIZE (Table 21).
Those families with four or more members have higher average
purchase rates (Group 3, Figure 12). Such families are
usually budget conscious and certain types of canned fish
do offer variety and a lower price than some meats.

Group 3 is split further by RELIGION. Those respondents
who are Catholic (the majority of this group). Jewish, and
other (non-Protestant) consume more canned fish than
Protestants (Group 6, Figure 12). The effect can be
attributed in part to Catholic respondents who still retain
some orientation toward the consumption of fish. This

residual effect was also identified in the frozen prepared finfish market where higher purchase levels were also associated with significant interaction between RELIGION and HOUSEHOLD SIZE variables.

Larger Catholic families tend to be more conservatively oriented toward their religious beliefs. The residual effect of fish consumption appears strongest for these individuals. This follows from the fact that larger families would imply higher parent age levels. Such levels would be associated with individuals whose religious beliefs are firmly established from past training in the more traditional beliefs of the Catholic Church.

For those respondents whose families consist of three or fewer members, further discrimination of average purchase rates is provided by the OCCUPATION variable. Those families who are technically or professionally oriented, such as high-income blue-collar and white-collar workers, consume high levels of canned fish (Group 5, Figure 12). Two possible explanations are offered and are different from those related to larger families who are regular purchasers of canned fish.

First, an element of convenience and/or quality may be involved. Canned fish does not usually carry an extremely offensive odor and there seems to be little stigma attached to its quality. It is also conveniently stocked in most stores and preparation prior to cooking is minimal.

Second, certain desired species of fish are sold primarily in canned form. These are tuna, salmon, and mackerel. The smaller family in many cases, moreover, includes a working wife who would be especially concerned with convenience and quality.

There also appears to be significant intercorrelation between the OCCUPATION and the INCOME variables. Higher income levels are associated with higher average purchase rates for small-family respondents.

In summary:

1. The variables of HOUSEHOLD SIZE, RELIGION, and OCCUPATION combine to explain 5.1 per cent of the variation of the dependent variable.

2. Large Catholic families consume significantly higher levels of canned fish. The traditional consumption of fish continues to affect the eating habits of the more traditional Catholics.

3. Smaller families (three or less members) who are either high-income blue collar or white collar workers have higher average purchase rates. Convenience, quality, and selective purchases of desired species of fish available primarily in canned form provide some basis for this observed behavior.

TABLE 20

CANNED FISH

SOCIOECONOMIC & ATTITUDINAL VARIABLES

Predictor Rank

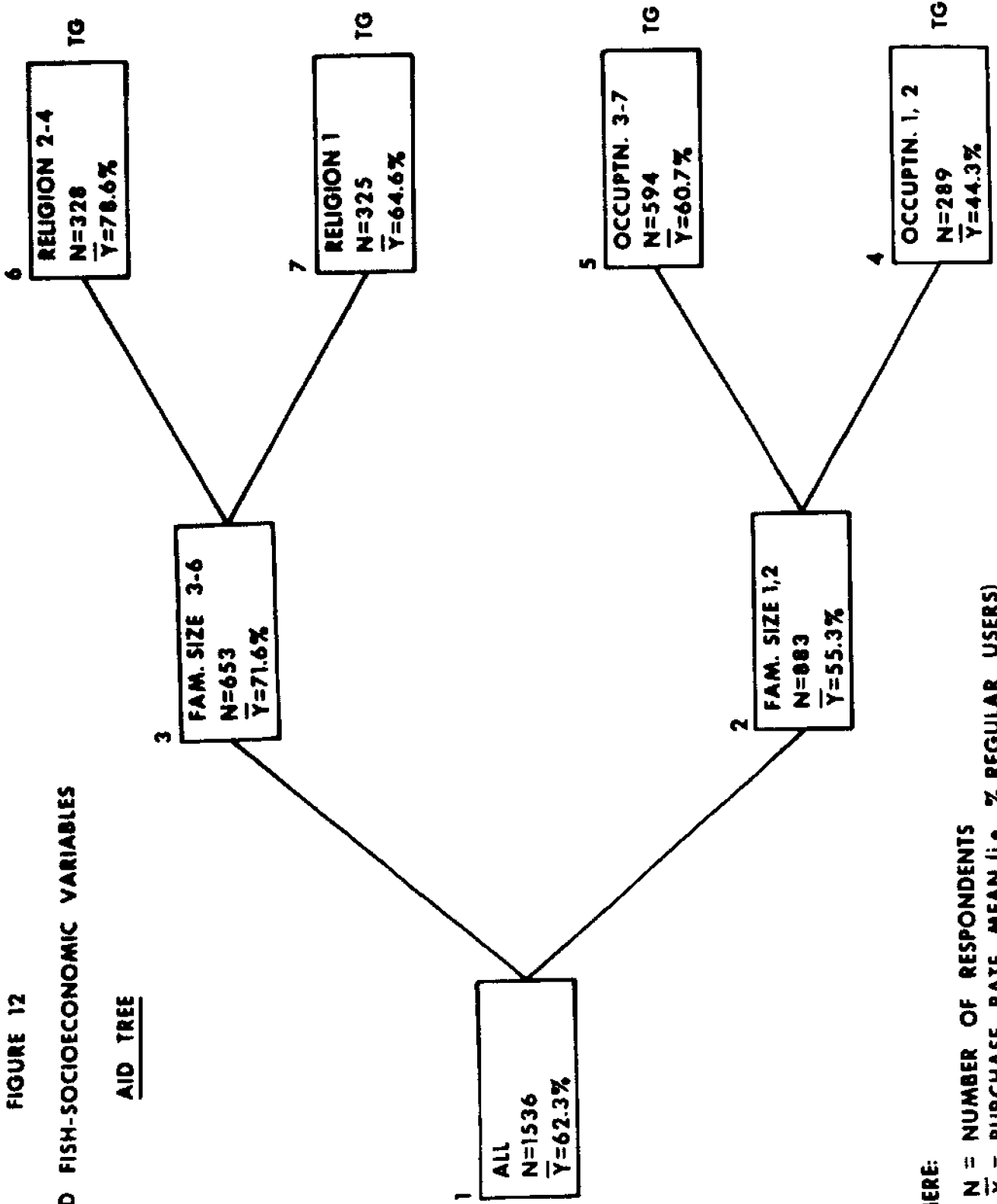| Predictor	Explained Variation (%)	Number of Categories
Socioeconomic		
HOUSEHOLD SIZE	2.7	6
OCCUPATION	1.5	7
RELIGION	0.9	4
Total Explained Variation=5.1% (i.e., R^2=0.051)		
Attitudinal		
TASTE	17.5	7
PERISHABILITY	1.6	7
QUALITY	1.5	7
WHOLESOME (C)	1.1	7
APPEARANCE	0.9	7
Total Explained Variation=22.6% (i.e., R^2=0.226)		

TABLE 21

CANNED FISH - SOCIOECONOMIC VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users (Ȳ)	Socioeconomic Characteristics of Respondents	% of Original Sample	% of Total Reg. Users	Probability Index
6	328	78.6	a) 4 or More Individuals in Family b) Non-Protestant	21.4	26.8	1.25
7	325	64.6	a) 4 or More Individuals in Family b) Protestant	21.2	21.9	1.03
5	594	60.7	a) 3 or Less Individuals in Family b) Higher Occupational Level (Professional)	38.7	37.8	0.97
4	289	44.3	a) 3 or Less Individuals in Family b) Lower Occupational Level (Non-Professional)	18.7	13.5	0.72
TOTAL	1536	62.3	N/A	100%	100%	1.00

FIGURE 12

CANNED FISH-SOCIOECONOMIC VARIABLES

AID TREE

1
ALL
N=1536
$\overline{Y}$=62.3%

3
FAM. SIZE 3-6
N=653
$\overline{Y}$=71.6%

2
FAM. SIZE 1,2
N=883
$\overline{Y}$=55.3%

6
RELIGION 2-4
N=328
$\overline{Y}$=78.6%
TG

7
RELIGION 1
N=325
$\overline{Y}$=64.6%
TG

5
OCCUPTN. 3-7
N=594
$\overline{Y}$=60.7%
TG

4
OCCUPTN. 1, 2
N=289
$\overline{Y}$=44.3%
TG

WHERE:

N = NUMBER OF RESPONDENTS
$\overline{Y}$ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)
TG = TERMINATED GROUP

Attitudinal Variables

Five of the 24 attitudinal variables combine to explain 22.6 per cent of the variation of the dependent variable (Table 20). The predominant variable is TASTE (Table 22). The majority of respondents (1163 out of 1536) favor the taste of canned fish and this results in a high average purchase rate which indicates that 72.7 per cent of the 1163 respondents purchase canned fish at least once a month (Group 2, Figure 13).

Even higher purchase rate levels result from the inter-action effects of the APPEARANCE and WHOLESOMENESS(C) variables (Groups 6 and 8, Figure 13). These respondents feel that canned fish has an appetizing appearance and is more wholesome than meat. Certain respondents also feel that canned fish does not spoil easily. This factor in conjunction with a preference for canned fish over meat leads to a very high purchase rate level of 80.7 per cent (Group 12, Figure 13). This market segment however, is small, representing only 5.1 per cent of the total number of respondents.

For those respondents who view canned fish as poor-tasting (Group 3, Figure 13), higher average purchase rates are associated with those respondents who feel the quality of canned fish is good. This discriminatory effect warrants further attention. Despite their negative attitude toward TASTE, these people still purchase canned

fish regularly. For these respondents, the overriding criterion for purchase is confidence in the quality of the product. These respondents might be characterized as shoppers who purchase fish products primarily from a menu variability standpoint and select canned fish because of its perceived high quality.

Interestingly enough, the market segment (Group 6, Figure 13) with the highest probability index (1.29) also has the largest number of respondents which represents approximately one-half of the sample. These respondents have a purchase rate mean of 80.8 per cent. This is the largest market segment with the highest purchase rate mean of the seven consumer markets analyzed. The purchase of canned fish is thus higher than any of the other fish product types.

Interaction is present in the AID-Tree. Groups 2, 4 and 6 form a series of cumulative advantages while Groups 3, 11, and 15 (Figure 13) form a series of cumulative disadvantages.

In summary:

1. The attitudinal variables account for more of the variation of the dependent variable than the socioeconomic variables (22.6 per cent versus 5.1 per cent).

2. The predictor variable of TASTE is significantly greater than the other attitudinal

TABLE 22

CANNED FISH - ATTITUDINAL VARIABLES

Market Segments

Group No.	No. of Cases (N)	% Reg. Users ($\bar{Y}$)	Attitudinal Characteristics of Respondents FAVORABLE	UNFAVORABLE	% of Original Sample	% of Total Regular Users	Probability Index
6	765	80.8	TASTE APPEARANCE		49.8	64.4	1.29
12	78	80.7	TASTE WHOLESOME (C) PERISHABILITY		5.1	6.6	1.28
13	177	57.6	TASTE WHOLESOME (C)	PERISHABILITY	11.5	10.6	0.93
10	121	47.1	QUALITY	TASTE	7.9	6.0	0.75
7	30	46.6	TASTE	APPEARANCE	2.0	1.5	0.73
9	113	43.3	TASTE	WHOLESOME (C)	7.4	5.2	0.69
14	90	35.5	PERISHABILITY	TASTE QUALITY	5.9	3.4	0.57
15	162	13.5		TASTE QUALITY PERISHABILITY	10.4	2.3	0.21
TOTAL	1536	62.3	N/A		100%	100%	1.00

FIGURE 13

CANNED FISH-ATTITUDINAL VARIABLES

AID TREE
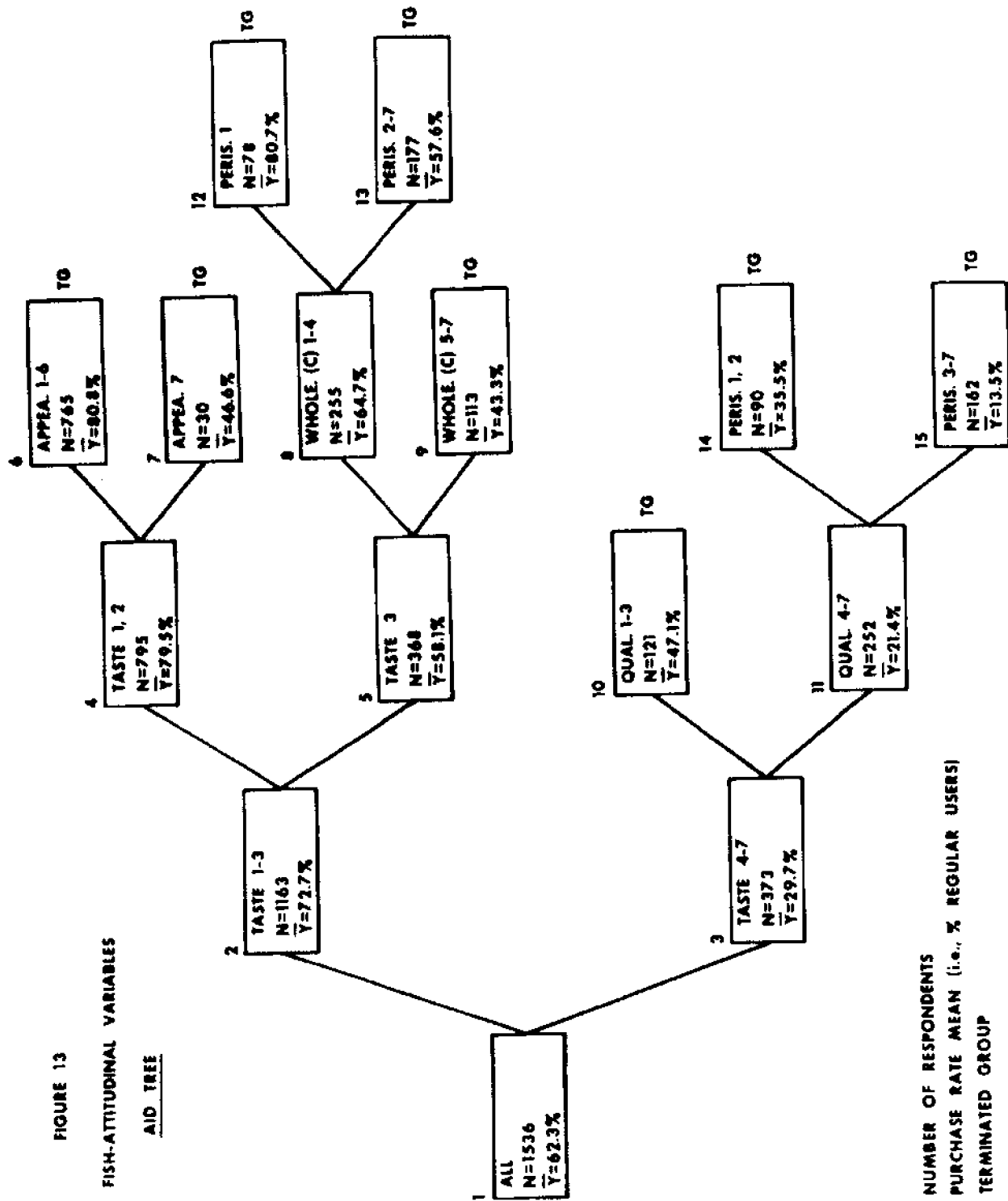
WHERE:

N = NUMBER OF RESPONDENTS

$\overline{Y}$ = PURCHASE RATE MEAN (i.e., % REGULAR USERS)

TG = TERMINATED GROUP

variables in predictive power. Respondents with a favorable attitude toward taste have higher average purchase rates.

3. Additionally, the appetizing appearance and quality of canned fish are important variables among some market segments that have a high proportion of regular users of canned fish.

4. A substantial majority of respondents purchase canned fish at incidence levels higher than any of the other fish product types.

CHAPTER IX

CONCLUSIONS

The results of the exploratory AID analyses are tentative and merely suggestive of relationships since they have not been empirically tested. Socioeconomic and attitudinal profiles, however, have been identified for each market where previously there was little structure for prediction or basis for determining marketing strategy.

The two critical questions that must be considered are: 1) how valid are the results, and 2) how can the results be utilized by those involved in marketing the various fish products? Validity is discussed first.

Validity

To validate the findings, that is, provide support for those relationships derived from the initial AID analyses, one alternative is to take another sample of approximately the same size and submit it to an AID analysis. If the AID Trees for the second sample are similar in branching structure, the results would support the initial findings. Rather than submit the data from the second survey to an AID analysis, a second alternative is to analyze the data by utilizing multivariate statistical techniques to test the exploratory hypotheses of the first sample based on the second. Hopefully, additional research along these lines will be conducted subsequently by NOAA or others interested in consumer behavior.

The question of model validity must also be examined from a structural standpoint concerning the validity of the variable set. That is to say, are there important predictor variables within the socioeconomic and attitudinal sets which have been conceptually overlooked? If so, very low R^2 (coefficient of determination) values would result.

The coefficient of determination values for the socioeconomic variable set ranges from a low of 0.000 to a high of 0.073 (1.000 signifying perfect correlation). Obviously, these are very low values and indicate two possible conditions. The variables are either 1) non-representative of the constructs they were designed to represent or 2) certain socioeconomic variables having predictive power were omitted. The careful questionnaire construction of socioeconomic variables and associated categories minimize the first condition. It thus appears that certain variables may have been omitted. Greater explanation of the dependent variable (purchase rate) and hence greater discrimination in the market segmentation effort might result if certain variables were added. Such variables might include geographical mobility, frequency of unemployment, whether or not they are sport fishermen, amount of fish they eat away from home for lunch or dinner, types of food stores at which they shop, and others. Although the socioeconomic set provides some explanation of the dependent variable, addition of these theoretical

constructs (and the variables which measure them) might enhance the ability of the socioeconomic variables to discriminate among market segments.

The attitudinal set, on the other hand, exhibits a higher range of R^2 values. The highest value is 0.271 and the lowest is 0.131. The various forms of finfish (including canned fin) range from 0.201 upward. Shellfish and its various product forms range from 0.149 downward.

Sonquist and Morgan's work with similar size samples and number of variables indicates that R^2 values greater than 0.200 are satisfactory, that is, the most important predictor variables have been included.[11] They attribute low correlation levels to "noise" and/or sample variability. From this, it is evident that the set of attitudinal variables is adequate for finfish and canned fish but somewhat inadequate with regard to shellfish.

Utilization

The second question to be examined is "How can the results of these AID analyses be utilized?" All seven types of fish are evaluated on the two characteristic sets of socioeconomic and attitudinal variables. Before the firm adopts a marketing strategy based on the characteristics

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[11]See J. N. Morgan and J. A. Sonquist, The Determination of Interaction Effects, Monograph No. 35, Ann Arbor, Michigan: Institute for Social Research, The University of Michigan, 1964, p. 57.

of each set, it must resolve three basic issues, namely,

1. Which characteristic set provides better purchase rate discrimination in conjunction with the accessibility of the firm to a particular market segment?

2. What level of delineation of markets is desired?

3. What market segments appear important, if any?

Selecting the Most Appropriate Characteristic Set

Attitudinal variables offer the largest R^2 values, but the socioeconomic variables in some cases may offer greater accessibility congruent to the objectives of the firm. The socioeconomic variables of RACE and INCOME, for example, may discriminate among market segments in a very meaningful manner. One observation of this research effort is that Negroes consume greater levels of fresh finfish and shellfish than white or other respondents. Another is that higher income respondents buy higher levels of frozen unprepared finfish and shellfish. Both of these relationships have significant input value to the retailer who must decide on a seafood product mix, both in type and process form. A socioeconomic examination of the local residential area can give some indication of race and income composition and correspondingly the relative product mix that should be emphasized.

Levels of Market Delineation and Emergence of Important
Market Segments.

The last two points may be resolved jointly. The
AID Tree, for instance, indicates various levels of market
segmentation. In turn, the relative strengths and corres-
ponding objectives of the firm's marketing program provide
the framework for deciding which market segments are
important. Those segments which represent a low percentage
of the original sample but contain a high percentage of
the regular users (i.e., high probability index) are
obviously of immediate interest. Once it becomes aware
of the significant market segments, the firm may allocate
its marketing effort specifically to those segments which
offer the greatest return in terms of higher purchasing
levels. Turning to frozen unprepared finfish, for example,
those respondents with favorable dispositions toward the
product attributes of TASTE, COST, and PREPARATION
constitute only 9.7 per cent of the total sample but
contain 23.2 per cent of those who are regular users.

Allocation of marketing effort can take various forms.
A case in point is media selection which involves selecting
the promotional medium most congruent with the market
segment of interest. Different media reach different
classes of consumers who possess distinct socioeconomic
characteristics. Since AID analysis identifies those
market segments with high probability indexes, it is
possible by utilizing the associated socioeconomic

characteristics to match media and market segments more efficiently. The cost per unit of market potential is then minimized.

Other promotional efforts may attempt to reinforce or alter the attitudes of consumers. Before doing so, however, the significant and non-significant attitudes must be identified.

Allocation of marketing resources is an important aspect of the marketing process. It is for this reason that this research has been undertaken for various fish product consumer markets. Hopefully a point of departure has been established to assist those who market these various fish products.

APPENDIX

DESCRIPTION OF AID PROGRAM

The AID program is a multivariate algorithm where, through a sequence of binary splits, the sample is partitioned into a series of exclusive subgroups. These arithmetic means explain more of the variation in the dependent variable than any other possible partition at each split. This is actually a repetitive one-way analysis of variance where the between sum of squares is maximized. The AID program's splits are determined by examining each variable and its categories and finding that variable and the binary partitioning of its categories such that the ratio of between sum of squares of the resultant subgroups to total sum of squares of the group being split (BSS_i/TSS_i) is maximized.